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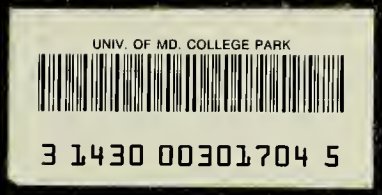

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STATE SCIENCE, ENGINEERING, AND TECHNOLOGY PROGRAM FOR THE MARYLAND EXECUTIVE BRANCH

FINAL REPORT
TO THE
GOVERNOR

February, 1980

Maryland Department of State Planning

State Science, Engineering, and Technology Program for the Maryland Executive Branch Final Report

Presented to
Governor Harry R. Hughes

By the
Comprehensive Policy Planning Division
Maryland Department of State Planning
Constance Lieder, Secretary

Planning Dept.

Publication

Program Manager
John Sherwood

Project Director
Marie Halka

Contributors
John Garber
Thomas Roguski

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Preface

This report represents the efforts of the Executive Branch of Maryland in the State Science, Engineering and Technology program (SSET) sponsored by the National Science Foundation under the NSF Authorization Act for Fiscal Year 1977 (P.L. 94-471). The purpose of the SSET grant program is to provide state governments with assistance in the development or improvement of their policy formulation processes through the utilization of scientific, engineering and technological resources. Through this program, funding has been made available to both the executive and legislative branches of State government.

Maryland has had nearly twenty years of experience in developing and implementing a science advisory capacity within its Executive Branch. In addition, the State has been a leader in promoting the use of innovative scientific and technological techniques for solving problems in the public sector. This study, therefore, has been undertaken as a review and evaluation of that experience. The recommendations are aimed at strengthening the existing science advisory mechanism within the Governor's Office, developing improved SSET capabilities within the policy management function of the Executive Branch, and furthering the State's role in the assessment of scientific techniques and technologies appropriate to the solution of public problems.

This SSET project has greatly benefitted from the willingness of federal and state agency officials and state advisory representatives.

Introduction

The federal government is spending some $28 billion on research and development (R&D) in fiscal year 1979. Approximately 40 percent of that total is in domestic areas in which state and local governments have substantial interest, involvement and responsibility.[1] Yet, as observed by Frank Press, President Carter's science advisor, the involvement of state and local government officials in establishing research and development agendas, program design or information dissemination has been minimal in spite of the fact that these officials have the service delivery responsibility for most of the federal R&D programs that do not involve space or national security. Maryland is no exception to this generalization although it has demonstrated an ability to bring science and technology knowledge to bear in a limited number of specific problem areas. The most recent information available on state R&D expenditures from the National Science Foundation ranks Maryland twenty-third in terms of total state agency R&D expenditures while it ranks eleventh in terms of total state government general expenditures.[2]

Several reasons for the traditional lack of interaction between the federal government and state and local officials concerning the plethora of federal R&D programs that exists can be cited. At the heart of the matter is the fact that science and technology (S/T) have yet to become central elements in the political and managerial strategies in state government even though S/T information is becoming increasingly necessary for problem evaluation.[3] One could argue that state governments have not been effectively brought into the process of priority

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1. Press, Frank, "Science and Technology in the Service of Cities," Public Management, July, 1978, p. 17.
2. Research and Development in State Government Agencies - Fiscal Years 1972 and 1973, National Science Foundation, Pub. No. 75-303, pp. 2,22.
3. Power to the State: Mobilizing Public Technology, The Council of State Governments, May, 1972, p. xiii.

setting for the vast federal R&D effort. But there are more basic issues involved which relate to the nature of science and technology and to the nature of political systems. Among these is the issue of perspective. Scientists tend to view problem-solving as a long-range activity spanning years or even decades whereas politicians are much more likely to seek immediate solutions to problems which have a chance of being realized during their relatively short terms of office. In addition, the politician must deal with growing constituent pressures for fiscal belt-tightening and increased accountability. State and local taxpayers demonstrate considerable reluctance to tolerate substantial expenditures in high risk situations which often accompany science and technology agendas. Compounding this problem is the mystique or "ivory tower" image that is frequently associated with science. Politicisns are not likely to rely on information that they themselves, let alone the general public, may have difficulty understanding or for which they can see no immediate use.

These, as well as other problems, have led to the contradiction in our society which is being articulated by a growing number of voices in scientific and business communities, and among federal, state and local government officials:

> On the one hand the U.S. has built the strongest and most effective industrial, commercial, agricultural, and military systems in the history of the world with strong reliance on heavy R&D investment and at the same time spent hundreds of billions of dollars each year on state and local government programs with negligible R&D focused outlays. It is not a question of the appropriateness of science and technology to /state and/local government, but rather the lack of experience in its use together with the resultant absence of a successful tradition, without which one could hardly expect public confidence, acceptance, and support. (Frank Press, 1978)

Stated another way, there is an abundance of scientific information in this

country but it has not been very successfully applied to solving problems faced by the public sector, particularly at state and local levels.

Nevertheless, the continued decentralization of federal programs and what has been called the "devolution" of decision-making authority and responsibility from federal agencies to those of state and local governments is shifting the nature of public problems and placing increased demands on government officials at the subnational level. Housing, pollution, crime, demands for new or better services, and increased administrative burdens of federal assistance programs are just a few of the mounting pressures on state and local officials.[4] The growing number and complexity of problems confronting state and local government officials has increased the demand for scientific and technical information. Intuition and bargaining are no longer sufficient as exclusive methods of decision making.[5]

There is then, a continual challenge to decision makers to define priority problems clearly and in such a way that technical solutions can be sought. At the same time, the scientist's burden is that of offering various technical alternatives and providing credible input concerning implementation problems, performance and consequences.[6] Without the establishment of a strong link between scientific and technological information and problem-solving, little progress can be made in bringing S/T information to bear on the decision-making and policy formulation processes of the public sector.

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4. Roessner, J. David, "Federal Technology Policy: Innovation and Problem Solving in State and Local Governments," Policy Analysis, v. 5, Spring, 1979, p. 184.

5. Power to the States - Mobilizing Public Technology (summary report), Council of State Governments, May, 1972, p. 1.

6. Roessner, p. 196.

Purpose of Project

The purpose of this State Science, Engineering and Technology (SSET) project is to evaluate ways in which the Maryland Executive Branch currently acquires and uses scientific and technological (S/T) information in its policy-making activities, and to identify ways in which that S/T capability could be improved. Because of the interdisciplinary and interagency nature of S/T information, the Maryland Department of State Planning has undertaken the project. As the Governor's principal staff agency in planning matters, the Department is charged with preparing and maintaining a balanced, integrated program for the development and effective employment of the natural and other resources of the State. Central to the Department's activities is the recommendation of policies to the Governor on issues relating to the physical and economic development of the State. The Department's duties include the preparation of the State development plan and the State capital facility budget as well as the review and coordination of State programs dealing with a wide range of policy issues (see Appendix: Article 88C of the Annotated Code of Maryland).

Maryland's SSET project has been conceived in two parts. The first part is the identification of existing institutional mechanisms for incorporating S/T information in the executive decision-making and policy formulation processes. Recommendations for bringing about an improved S/T capability in the Executive Branch are based on an analysis of the limitations of these mechanisms. The second part of the project is an examination of the role of the Executive Branch in relation to technology assessment (TA). Included in this portion of the study is an analysis of current State involvement in TA, opportunities that exist for the expansion or improvement of Maryland's TA activities, and the results of a case study that was undertaken to assess the applicability and transferability of S/T resources to selected issues of immediate concern to the

State. Results of this project component form the basis of recommendations for enhancing the Executive Branch capability for dealing with technological developments.

Recommendations

The Executive Branch of Maryland State Government is undergoing a reorientation pursuant to the major change in administration that resulted from the 1978 gubernatorial election. Governor Harry Hughes appointed nine new executive agency heads who serve as part of his twelve member cabinet. From an institutional standpoint, transitional activities are just beginning to focus on science and technology input to the Executive Branch. Governor Hughes has, for example, appointed the current executive director of the Governor's Science Advisory Council, Mr. Harry Kriemelmeyer, to the National Governors' Council for Science and Technology. Furthermore, the GSAC which has been relatively inactive since its creator, former Governor Mandel, left office, is being reactivated by Governor Hughes in a series of meetings during January and February of this year. This action was taken following recommendations made by members of the GSAC and further supported by the findings contained in the initial draft report of this SSET program effort.

Based on the nearly twenty years of experience Maryland has had in developing a science advisory capability within the Executive Branch, the experience of several other states in this area, and the results of this study, it is recommended that executive science and technology resources be constituted in a two-part organization. The first part consists of the GSAC whose role is one of providing advice on science and technology issues directly to the Governor. The GSAC would continue to function as a panel of experts who investigate emerging S/T issues and offer assessments in an unbiased, non-partisan manner. In this way, the members of the GSAC are free to operate objectively and scientifically and to offer their assessments in an atmosphere unencumbered by political considerations. The GSAC would, therefore, function in an essentially policy neutral role.

The second recommended component of the executive S/T capability is the consolidation of S/T policy management activities within the Department of State Planning. In its role as the S/T policy management arm of the Executive Branch, the Department of State Planning would be responsible for providing the S/T basis for a variety of short and long-term State policies, plans, and programs. This role is compatible with the Department's current function as the central planning agency of State government (see Appendix: Article 88C).

Figure 1 illustrates the basic relationships between the various elements comprising the State science and technology institutional mechanism as described. Within the Executive Branch, the key advisory linkages are: 1) GSAC identification of issues requiring S/T input which should be given priority consideration by the State, 2) the objective S/T assessment by the GSAC of alternative approaches to these issues, 3) Department of State Planning evaluation of the economic, social, environmental, institutional and/or political consequences of alternative S/T approaches to major State issues, and 4) final S/T policy recommendations by DSP to the Governor. Secondary relationships shown between the GSAC and DSP, DSP and the other executive agencies, and DSP and the State Legislature represent important channels of communication that may influence the eventual policy outcome on a given issue.

In order to establish this two-part science and technology advisory capability within the Maryland Executive Branch, the following recommendations are made:

I. The GSAC - Strengthening the Existing Science and Technology Advisory Mechanism in the Governor's Office.

   A. The Governor reactivate the Governor's Science Advisory Council (GSAC) by appointing a new chairman and members to fill the existing vacancies (in progress: January-February, 1980).

   B. The Governor designate a member of his immediate staff, the Secretary of the Department of State Planning, and other representatives as appropriate to serve as liaison between the GSAC and the Governor's office.

C. The Governor or his representative convene regularly scheduled meetings with the chairman, executive director and other appropriate members of the GSAC to receive their input on S/T issues of priority concern to the State.

II. The Department of State Planning - Improving the Coordination and Management of Scientific and Technological Resources as Applied to the Development of State Policy within the Executive Branch.

A. The Governor direct the Department of State Planning as the central planning agency for the Executive Branch to undertake an official role as the science and technology policy management office within that branch.

B. The Department of State Planning adopt the following two objectives in carrying out its role as the science and technology policy management office:

1. Strengthen the capability of the Executive Branch to apply scientific and technological resources to the formulation of State policy.

2. Develop methods for evaluating the economic, social, environmental, institutional, and/or political consequences associated with scientific and technological solutions to important State issues.

In fulfillment of these objectives, the Department should investigate the feasibility of:

1. Applying science, engineering, and technology resources to State issues of major concern. These may include but not necessarily be limited to the following areas which may require S/T policy determination:

a) State development policy formulation.

b) Chesapeake Bay management.

c) State energy consumption and production linkage.

d) Toxic substances disposal management.

e) Emergency preparedness planning.

f) Appropriate technology utilization.

2. Continuing Maryland's participation in the Landsat technology transfer and assessment program in order to advance the State's land use management capabilities.

3. Developing an improved system of communicating with federal, interstate, and private organizations involved in evaluating the use of science and technology resources by the public sector.

4. Undertaking a comprehensive review and evaluation of State personnel policies and practices that affect the employment of scientists, engineers and technologists by State government.

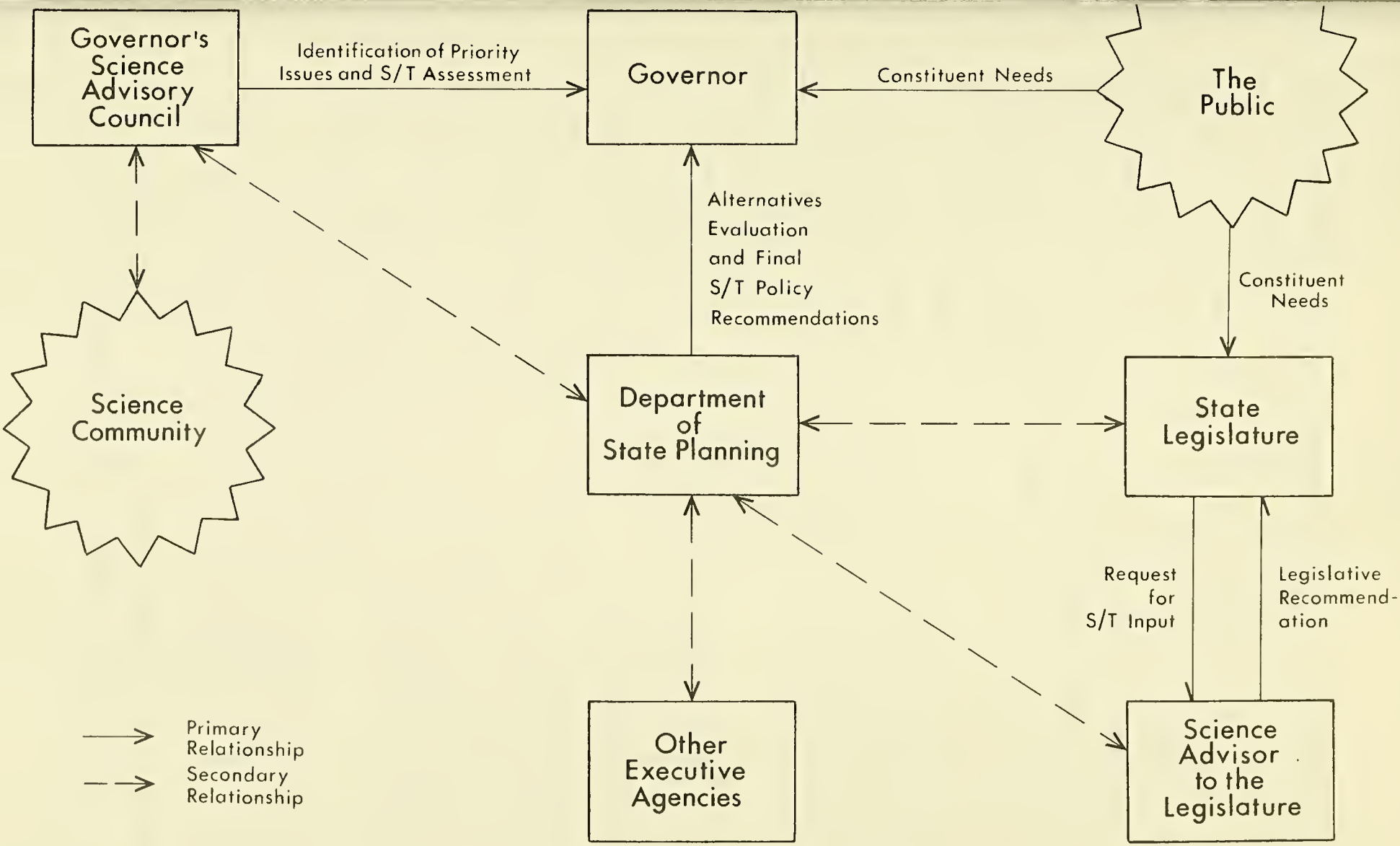

Figure 1: Maryland State Science and Technology Advisory Mechanism (with proposed organization within the Executive Branch)

Part I. MARYLAND'S INSTITUTIONAL SETTING FOR SCIENCE AND TECHNOLOGY UTILIZATION

The SSET capabilities of the Executive Branch of the State of Maryland are well established. They provide a firm foundation upon which additional networks can be built and existing links can be strengthened. The degree of dependence placed upon this multiplicity of available scientific and technological resources is directly related to their demonstrated capacity for providing workable solutions to the problems confronting State government.

The following discussion provides an overview of the current scientific and technological capability in Maryland's Executive Branch. A more detailed description and evaluation of the Governor's Science Advisory Council and the Scientific Council of the Maryland Academy of Science is presented in succeeding sections.

A. Current SSET Capability in the Maryland Executive Branch - An Overview

The major sources of scientific and technological input to the Maryland Executive Branch include: 1) executive councils, commissions, advisory boards, committees and task forces; 2) executive agencies; 3) independent State agencies; 4) State and private colleges and universities; and 5) interstate organizations. In addition, the Governor can seek S/T advice from private institutions, industry, and ad hoc "blue ribbon" panels which may be created to study and make recommendations on specific State issues.

The scope of S/T information which is provided within or may be made available to the Executive Branch is extensive. Energy, the environment, natural resources, public health, agriculture, economic development, land use planning, transportation, and human services are only some of the areas in which S/T information is generated or obtained

and utilized. In addition, S/T input is often applied in improving the day-to-day efficiency of State operations in areas such as data processing, procurement, or construction of State capital facilities.

Although a comprehensive inventory of all Executive Branch S/T components is not possible within the budgetary limitations of this study, several representative examples will serve to illustrate the breadth of Maryland's institutional experience in applying science, engineering and technology information to the executive decision-making process.[1]

The Office of the Executive, twelve major departments, and over sixty independent agencies, boards and commissions constitute the Maryland Executive Branch. The Governor's Executive Council, created in 1969, is responsible for the over-all coordination, direction and supervision of the State government. This cabinet body consists of the Governor, Lieutenant Governor, Secretary of State, and all Secretaries of principal departments who serve at the Governor's pleasure. All major interagency issues, including those of a scientific or technological nature, may be reviewed by the Council.

Of the several independent agencies in the Executive Branch, the Governor's Science Advisory Council is specifically charged with the duty of providing the Governor with objective scientific or technological advice as deemed necessary and appropriate by the chief executive. The Council's responsibilities include identifying broad future problems in all fields to which scientific approaches should be

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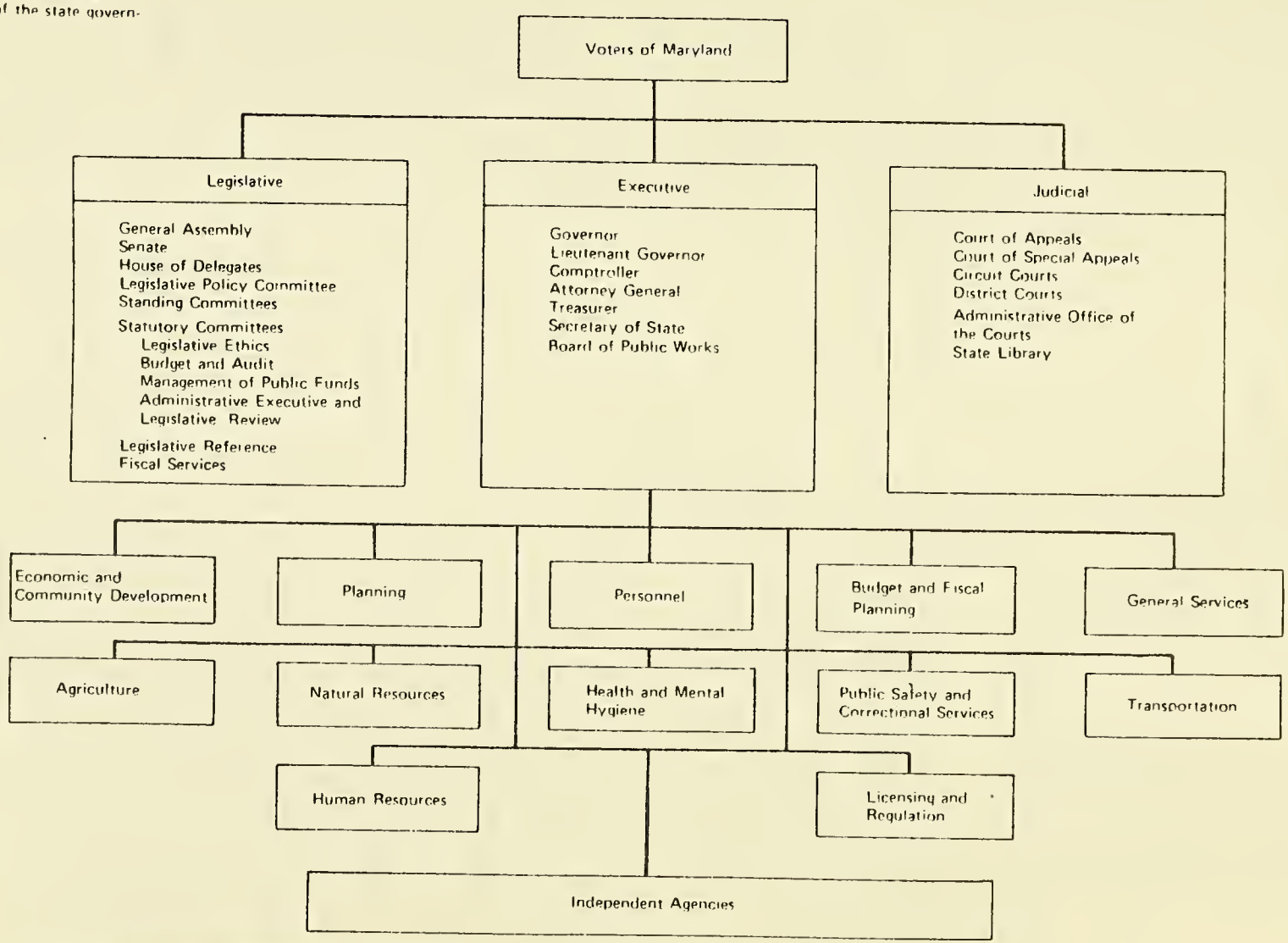
1. This review of Executive Branch S/T capability is based on information abstracted from the Maryland Manual 1979-1980, Science in the Maryland Marketplace 1978-1979 -- A Directory of Science Resources in Maryland, and from interviews with selected State officials and advisory representatives.

ORGANIZATION CHART OF THE MARYLAND STATE GOVERNMENT*

This chart seeks to show only the more important agencies of the state government



*from the Maryland Manual 1979-1980.

applied, formulating recommendations to alleviate these problems, defining problem areas to which committees could find solutions or recommendations for action; and identifying scientific areas where additional research or analysis is badly needed. Serving as liaison between State government, academia, and private researchers, the Council is concerned with furthering science education and coordinating approaches to common scientific problems.

In addition to the GSAC, the Executive Branch has utilized the expertise of the Scientific Council of the Maryland Academy of Science. The Council is a high-powered research arm of MAS. Through the efforts of the Council and the State Department of Natural Resources, the Environmental Research Guidance Committee has been formed to assist the State's Power Plant Siting Program.

The Department of State Planning functions as the Governor's staff agency in planning matters and prepares, recommends, and keeps up-to-date a balanced integrated program for the development and effective employment of the natural and other resources of the State. The Department advises the Governor concerning matters of policy and the means available to coordinate the plans and programs of all levels of government in order to avoid duplication. Preparing components of the State development plan and the State capital program and annual capital budget are the most significant policy-related functions of the Department. The compilation of basic socio-economic data, the operation of an automated geographic information system, and the operation of the State Intergovernmental Assistance Clearinghouse use scientific, engineering, and technological data inputs. These functions constitute the major S/T components of the Department. In addition to its day-

to-day operations, the Department is actively involved in the State Development Council created by executive order of the Governor in January of this year. The Secretary of State Planning chairs the Council which consists of cabinet level representatives from the Department of Transportation; Natural Resources; Economic and Community Development; Agriculture; and Health and Mental Hygiene as well as the Lieutenant Governor. Principal staff support to the Council is provided by State Planning and Economic and Community Development. The role of the Council is to provide the Executive Branch with policy guidance concerning the effective and efficient allocation of State resources for physical and economic development decisions (see Appendix).

Another independent agency in the Executive Branch, the State Council on the Environment, directly ties S/T input to the executive decision-making process. The Council assists in the formulation of a coordinated policy for the development and protection of natural resources, the protection of the environment and public health, and the stimulus of the State's economy. It has the responsibility to assist in the resolution of potential conflicts between the interests of private industry and the protection of the State's environment.

The Maryland Public Service Commission also provides a direct link between S/T information and decision-making. Among its several duties, the Commission exercises jurisdiction over all gas, electric, telephone, telegraph, water, sewage disposal, heating and refrigerating companies operating in Maryland. S/T data is constantly used by the Commission in performing its mandated role.

Within the remaining eleven major executive agencies, S/T information is applied in a variety of ways. For example, the Department of Agriculture, newest of the major executive agencies, directly employs scientists or those with some technical training in the State Chemist Section, the Office of Pest Management, the Weights and Measures Section, and various food inspection units. The influence of S/T input on policy formulation is evident in Maryland's Agricultural Land Preservation program which is administered by the Maryland Agricultural Land Preservation Foundation, formed in 1977. The intent of the program is to preserve productive agricultural land and woodland in Maryland, to provide for the continued production of food and fiber, to curb the extent of urban sprawl, and to protect agricultural land and woodland as open space. The newly created State Development Council, chaired by the Secretary of State Planning, will be addressing the issue of State agricultural preservation policy as part of its mandated activities.

In the area of public health, the Maryland Department of Health and Mental Hygiene has the responsibility for dealing with the epidemiological dimensions of health hazards such as environmental pollution and communicable disease. Within this department, the Environmental Health Administration is charged with the responsibility to provide an environment free of the uncontrolled release or disposal of toxic, hazardous, or undesirable substances or emissions. The Air Quality Control Advisory Council of DHMH has been established to adopt

rules and regulations for the control of air pollution. Membership must include a mechanical engineer, a chemical engineer, two members experienced in air pollution control submitted by the Maryland Chamber of Commerce, one doctor of medicine, and one member each from lists submitted by the University of Maryland, the Johns Hopkins University, the Council of Governments of Metropolitan Washington, and the Maryland AFL-CIO. The Council serves in a S/T advisory capacity to the DHMH and reviews recommended regulations. The Interagency Noise Control Committee consists of one member appointed from the Governor's staff, one member from DHMH, and members of the Departments of State Planning, Natural Resources, and Transportation. They receive reports of progress, problems, and proposed plans from member agencies on present and future efforts to achieve State environmental noise standards and make recommendations for regulations.

The Toxic Substances Control Program administered by EHA coordinates State activities with federal and local programs in establishing appropriate control methods for toxic and carcinogenic substances. Also within EHA are the Community Health Program which regulates the distribution and sale of milk, food, and other consumer products; the Air Quality Program which develops air resource management plans and strategies; the Construction Grants and Planning Program which reviews and revises plans for sewerage control and awards federal and State grant funds for facility construction; and the Water Sewerage Control Program which develops and implements programs to provide safe and adequate public drinking water, and is responsible for identifying and abating sources causing pollution of shellfish growing waters and recreational waters.

The Construction Grants and Planning Program within DHMH is actively promoting and assisting grantees in the implementation of utilizing innovative and alternative treatment systems as mandated by the 1977 amendments to the federal Clean Water Act. Specific technologies with which the Department has experimented include aeration systems, mound systems and evapotranspiration disposal.

The Maryland Department of Economic and Community Development has ten major units and maintains membership on several commissions. In terms of S/T capability, DECD has a dual role to play. The Department makes use of scientific and technological information in its own operation and can also contribute to the support of private businesses in the field of technology innovation through the Development Credit Corporation which is authorized to stimulate business and industry in the State by making loans available to small firms that would not qualify for loans from conventional institutions.

DECD serves as the Maryland membership unit on the Southern States Energy Board, an interstate compact agency created in 1962. The SSEB is active in promoting the economy of the Southern region and works toward improving individual and community well-being within member jurisdictions through programs in the fields of energy, science and technology, environment, and related areas of interest.

Much of the State's Executive Branch S/T capability is contained in the Department of Natural Resources which was created in 1969 to consolidate all conservation and natural resource development agencies. A variety of advisory commissions and boards dealing with key State issues such as hazardous substances, scenic rivers, and open space serve the Department. The newly created Energy Administration within

DNR consolidates the activities of the Energy Office, the Bureau of Mines, and the Power Plant Siting Program (the PPSP is more fully described in Part II of this report). The Tidewater Administration, also newly formed, contains the State's coastal zone management program and tidewater fisheries activities.

The Energy Office coordinates the State's efforts in the area of energy conservation. The Office performs a technology assessment role through efforts such as its wood and solar users monitoring project, and its promotion of life-cycle costing and materials recycling in cooperation with the Department of General Services. Through DGS, Maryland purchases recycled paper for general office use and for State printing purposes. Most recently, DGS has developed a waste paper collection program which will go into effect by the end of the year.

Within DNR, the Maryland Environmental Service represents an innovative approach to the problem of environmental pollution. As a public corporate utility, the Service has the powers necessary to plan, design, finance, construct and operate liquid and solid waste management systems and water supply facilities.

The Maryland Geologic Survey is a scientific arm of DNR responsible for geologic, hydrographic, and geophysical surveys. MGS prepares topographic and geologic maps and makes reports on the extent and character of the State's geologic,

mineral, archeologic, and water resources. Research on coastal estuarine problems relating to erosion and sedimentation along bay and ocean shorelines is conducted by the Survey.

Within the Department of Transportation, science and technology are utilized to improve the efficiency and safety of Maryland's multimodal transportation system. In particular, the State Aviation Administration provides technical and financial assistance to airport sponsors and owners in the preparation of master plans and in improvements to facilities. The Railroad Administration applies technical information in its efforts to rehabilitate passenger and freight lines and through its subsidized commuter service. As the public transit arm of the Department, the Mass Transit Administration operates and maintains the public bus system and proceeds with the development of the Baltimore Region Rapid Transit System. The Administration must keep abreast of the latest developments in mass transit technology as it administers a program to provide technical and financial assistance for the development or improvement of public transportation facilities in small urban areas throughout the State.

Technical advances in the fields of law enforcement and emergency assistance are used by the Department of Public Safety and Correctional Services. Within this agency are the State Police, Fire Prevention Commission and Fire Marshall, the Maryland Civil Defense and Disaster

Preparedness Agency, and various corrections related units. At present, the Civil Defense and Disaster Preparedness Agency is cooperating with the Departments of State Planning, Human Resources, and Natural Resources in a joint effort under the aegis of the Governor's Office to evaluate the State's system for emergency preparedness and response.

The remaining principal departments in the Maryland Executive Branch - Human Resources, Licensing and Regulation, and Budget and Fiscal Planning - make more limited or indirect use of S/T information than the other agencies. Budget and Fiscal Planning, for instance, is responsible for State automatic data processing and thus, has a specific interest in that area.

The major academic arm of the State is the University of Maryland which is the State university and the "Land Grant" institution of Maryland. There are four principal campuses offering programs leading to baccalaureate as well as more advanced degrees. A variety of on-going programs outside of the academic mainstream are in operation which have strong S/T components.

The research program of the University of Maryland, Maryland Agricultural Experiment Station is primarily oriented toward the improvement of the efficiency of Maryland agriculture. Research, both basic and applied, includes improvement of crop varieties, animal breeds, husbandry, tillage and harvesting equipment or systems, pesticides and means of application, on-farm and off-farm storage, processing and utilization or marketing of food and feed crops. In addition, nutrition of people as well as plants and animals, soil science, and rural development are studied. A secondary aspect of

most of the approximately 225 separate projects relates to optimizing utilization of land and water resources and enhancing the quality of the environment.

The Bureau of Business and Economic Research at the University is concerned principally with basic research in regional and urban development with emphasis on economic forecasting, regional public finance, and environmental management. It undertakes cooperative research contracts at the request of federal and State agencies, research foundations, and other groups. The Bureau staff provides referral services and consultation on problems of business and economics, particularly as related to environmental management and regional development.

The Center for Environmental and Estuarine Studies was created as a branch of the University in 1973. Research is conducted at five Center laboratories on the natural resources of the region, with emphasis on the activities of three laboratories relating to the Chesapeake Bay estuarine system. Research generally falls into the categories of renewable resources, wastes, energy, land and water use, and environmental education. Center scientists study forest entomology and genetics, wildlife ecology, diseases of estuarine animals; fisheries populations, watershed dynamics, effects of toxic materials on land and in water, ecological effects of power plant operations; effects of dredging; aquaculture of oysters; and many other topics.

The Institute for Physical Science and Technology was established on July 1, 1976 to provide a center for interdisciplinary research within the Division of Mathematical and Physical Sciences and Engineering. Emphasis is placed on scientific areas in which the University has a

clear interest but which are not yet covered by the academic departments. The Institute provides a flexible mechanism within which new programs can be explored and developed. The Institute also manages several central research facilities which are made available to all research scientists on the campus. These include the Electron Microscope Facility, the X-Ray Diffraction Facility, the ESCA Laboratory, and the Coordinated Laser Facility. Current research topics include a variety of problems in applied mathematics, plasma physics, statistical physics, optical physics, fluid mechanics, materials science, and biomathematics.

Current projects of the Water Resources Research Center at the University include the effect of processing oysters on water quality, constituents of sewage effluent toxic to fish and evaluation of the environmental impact of a large cooling tower using brackish water. Research findings are published in annual progress reports, technical reports and articles in professional literature. Topics addressed by published reports include: the cost of treatment versus environmental damage for State water research management, biological nitrogen fixation and denitrification in a brackish marsh, digital model of the ground water system in Anne Arundel County, and policy analysis of reservoir operations in the Potomac River Basin.

In addition to the array of public agencies with S/T capability, the Executive Branch may rely on an extensive pool of researchers associated with private institutions and industry. Notable examples include the Metro Center, a research organization focusing on urban issues; the Chesapeake Bay Institute which conducts physical, chemical and biological studies of the Bay; and the Applied Physics Laboratory

which has expanded its activities beyond defense research to include economic impact assessments in the context of addressing civilian problems. Each of these institutions is affiliated with the Johns Hopkins University and has been consulted by the Executive Branch in connection with specific State problems. Other academic institutions, private foundations, and individual firms too numerous to include here may be consulted by the State for valuable scientific, engineering and technological advice.

In conclusion, the supply of S/T input to the Maryland Executive Branch is abundant. If a specific science or technology capability does not already exist within State government, it can be sought in the private sector. The keys to the successful employment of S/T information in solving State problems lie in the creation of a demand for scientific or technological solutions and in the effective coordination of State activities toward achieving those solutions.

1. The Governor's Science Advisory Council

The following discussion provides an in-depth view of the background and current status of the Governor's Science Advisory Council (GSAC). Insuring a continuous role for this science advisory mechanism has been an important issue during its nine-year existence due to the major changes in administration that have occurred over that period of time.

The GSAC was appointed by Executive Order in 1970 under former Governor Marvin Mandel. The Council became the successor to the Governor's Science Resources Advisory Council which was created during the administration of J. Millard Tawes (1959-1967) and continued under Spiro Agnew's tenure as the State's chief executive (1967-1969). Thus, the concept of a science advisory role located

in the Office of the Executive is not a new one in Maryland. In fact, the existing institutional mechanism has been used as a model by at least three other states (Iowa, Pennsylvania and Florida

The specific responsibilities of the GSAC are contained in its originating executive order and bylaws (Appendix). The twenty-eight member Council consists of scientists and engineers who provide part-time scientific and technological advice directly to the Governor at his request. Between $20,000 and $40,000 had been set aside in the State's budget to cover the annual operating expenses of the Council until 1977. In that year, a budget crisis resulted in the loss of direct GSAC appropriations. Since then, incurred costs have been informally covered by the Governor's Office.

The GSAC membership has been drawn from an impressive pool of highly respected scientists throughout the State who are selected without regard to political affiliation and who serve on a voluntary basis. The first chairman, Dr. Laster, was a member of the Physics Department at the University of Maryland and the first executive director was chosen from the faculty of the U.S. Naval Academy in Annapolis. In 1973, a new executive director, Mr. Harry Kriemelmeyer, was selected and in 1975, Mr. Mitchell Kapland replaced Dr. Laster as chairman. Mr. Kriemelmeyer is on the faculty at the University of Maryland and Mr. Kapland is chairman of Trident Engineering Associates, Inc. To date, Mr. Kriemelmeyer continues to serve as GSAC executive director. The chairmanship as well as five member seats are currently vacant. Office space has been provided since 1970 at the University of Maryland.

The GSAC met regularly with its creator, former Governor Mandel. He provided the Council with an agenda of high priority issues he felt needed S/T input or evaluation. Among these were the impacts of sludge dumping on Hart Miller Island, air quality and solid waste assessments, Chesapeake Bay estuarine studies, and a comprehensive State energy assessment. The energy assessment, conducted in 1973, was later adopted as a model by the National Governors' Association and applied in several of the States. During this time, the GSAC was organized into five subcommittees including energy, environmental quality, natural resources, intergovernmental relations, and scientific and technological education.

In June, 1977, Blair Lee III became Maryland's Acting Governor. During his tenure of a year and half, the GSAC was relatively inactive due to a lack of direction on the part of the Acting Governor. This lack of direction did not necessarily reflect a lack of gubernatorial interest but apparently indicated to the GSAC that Lee viewed the acting governorship as a caretaker's role and was unwilling to initiate new studies of a scientific or technological nature while in that capacity. The only noteworthy occurence concerning the GSAC during this time was a recommendation that the Council provide the Maryland Department of Economic and Community Development with technical support in the production of a comprehensive program for attracting environmentally sound new industries to the State. An excerpt from Maryland Marketplace, A Five-Part Strategy for Economic Development: Resource Papers states:

> "...the Governor will request the Governor's Science Advisory Council (GSAC) to work with the Department of Economic and Community

> Development to design a comprehensive program for attracting industries whose activities center on research, development, and the manufacturing of products for energy conservation, resource recovery, environmental protection, and the health sciences. This effort will identify inhouse requirements for dealing effectively with representatives of these industries and potential new educational programs in the applied sciences that would lead to new industries and products oriented toward these objectives."[2]

No action, however, was taken on this recommendation.

With the change in administration brought about in the election of 1978, the GSAC has become temporarily inactive. It is awaiting final approval from Governor Harry Hughes for the selection of a new chairman as well as new members to fill the current vacancies.*

It should be noted that in 1977, the State Legislature created the Science Division within the State Department of Legislative Reference to develop S/T information at the request of legislators, committees, staff, and referred constituents. The Division consists of Dr. Myron Miller, the Science and Technology Advisor, his assistant and a division secretary. Division offices are located in Annapolis. Although the executive director of the GSAC and the legislative science advisor meet informally, the functions of their science advisory mechanisms are entirely separate, reflecting the appropriate division of the executive and legislative branches of state government.

2. The Maryland Academy of Science

The Maryland Academy of Science is an independent professional organization and the second oldest institution of its kind in the

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2. Maryland Marketplace, A Five-Part Strategy for Economic Development: Resource Papers, Maryland Department of Economic and Community Development, May, 1978, p. 45.

* The GSAC has been officially reactivated as of January 15, 1980.

U.S., having been established in 1797. Since the late 1920's, the Academy has been oriented towards interpreting scientific and industrial developments for public education. Currently the MAS is located in Baltimore's Inner Harbor on land donated by the City. Private contributions and financing assistance from the City and State were used to build the Maryland Science Center which opened in June, 1976.

The Academy has a full-time staff of 50 members assisting the Board of Trustees. Its mission is to promote the advancement of science, encourage public interest in and understanding of science, conduct an active program in science education, and serve as a central focus of scientific activities, both professional and amateur, in the State of Maryland. The Academy conducts programs in the following science education activities: 1) science education programs for children and adults, 2) Planetarium programs, 3) exhibits, 4) a film and lecture travel series, 5) the Environmental Research Guidance program, 6) an annual award to Maryland's Outstanding Young Scientist. Administrative and operational services are provided by the Office of the Executive Director and the Department of Development and Finance and Exhibits and Facilities.

Scientific advice and review are provided to the Academy by the Scientific Council consisting of Maryland scientists and engineers. Members of the Council meet voluntarily once a month for ten months of the year at the Maryland Science Center. Their activities vary from providing professional scientific review of exhibit content to providing judges to select Maryland's Outstanding

Young Scientist. In order to commit the Council which has no permanent operating budget to a given task, the monies and other support resources must be available through other sources.

The Scientific Council has made a significant contribution to the science and technology capability of the Maryland Executive Bran Through the Department of Natural Resources, the Council has been requested to establish the Environmental Research Guidance Committee The purpose of the ERGC is to act as an advisory body to Maryland's Power Plant Siting Program (the PPSP is more fully described in Part II of this report). Twenty scientists have been selected by the Scientific Council along with six "ex-officio" members from Stat agencies and private laboratories to serve on the ERGC. Their tasks are to identify research needs, develop programs related to environmental impacts of power plant siting and location, assist in proposa review, and to evaluate ongoing research. ERGC scientists receive honoraria from an environmental trust fund. In addition to selectin the members of the ERGC, the Council established their guidelines fo regulations, research policy, and administrative procedures. As an ongoing responsibility, the Academy coordinates the ERGC/PPSP monthl meetings.

The ERGC is divided into five subcommittees: 1) biology, 2) aquatic transport and dispersion, 3) atmospheric transport and chemistry, 4) socio-economic, and 5) engineering. Biological studie have included the effects of chlorine toxicity or other foreign matter on estuarine environments, forest ecology in relation to bird habitats, and sulfur dioxide impacts. The aquatic transport and dispersion subcommittee investigates wind-driven circulation of particles in the Potomac. The atmospheric transport and chemistry

subcommittee analyzes power plant plumes under various weather conditions. Items such as the feasibility of switching to different fuels and the sediment behavior in dredged disposal basins are addressed by the engineering group. Finally, the socio-economic section explores the economic impact of power plants and residential energy efficiency.

The research efforts of the ERGC have provided the Executive Branch with valuable S/T information and guidance in the decision-making process related to the siting of electrical power facilities. Although research efforts have been primarily limited to the realm of energy production, there is a vital potential role for the Committee to serve in the area of energy consumption as well.

B. Review of SSET Mechanisms in Other States

Close observation of the SSET activities in over a half dozen states from Oklahoma to Minnesota and from Virginia to Colorado demonstrates that SSET mechanisms are in constant evolution. The changes in these mechanisms which have been observed over the last few years at first appeared to be unrelated or unpredictable due to the varying conditions in each state. However, when viewed against the background of common pressures facing state governments today, these activities begin to show identifiable trends.

At first, each state attempted to deal on an ad hoc basis with S/T related problems, similar to the way in which these issues had been handled in the political arena. As demands for highly technical information became more frequent, governors and state legislatures began to look for more permanent solutions. Here again what seems to be a "shotgun" approach is just the typical diversity that can be found whenever any new issue is tackled within a political context. Gradually, track records were established in several states which showed that

certain mechanisms were working. Maryland's gubernatorial science advisory mechanism, for example, has been used as a model by at least three other states including Iowa, Pennsylvania and Florida.

The repeated use of independent foundations, task forces and study commissions has given way in many states to the establishment of some form of permanent board, commission, committee, or council of science and technology advisors. Linkages to private industry, colleges and universities, and state agencies are created through the individuals who are chosen for these advisory bodies. Depending upon the fiscal capabilities of each state and the personalities of the advisors and the governor, the exact functions of these groups will vary. With reliable fiscal support, aggressive membership, and access to the governor, science councils have become influential. Their effectiveness is reduced when this vital mix of ingredients is not present.

Quite often a single science advisor can be found functioning in concert with these councils. Their roles vary in many respects according to the specific conditions but in all cases they seek to compliment and supplement the science advisory group. The science advisor's position created by the governor or state legislature can be seen as providing continuity to the SSET process. They can predate the creation of a science council, work with it during its "peak activities," and then hold on as momentum begins to disappear. The science advisor, with or without a staff, can fulfill an ever present bureaucratic need. He is viewed as the one responsible for "science" input whenever it is deemed necessary.

The most recent evolutionary trend in SSET mechanisms is the integration of scientific and technical advisory services into the central management functions of the states. In-house SSET capabilities are being created within state agencies at both the staff and line

levels. Line agencies are building SSET expertise in their areas of specific responsibility while staff agency SSET generalists are providing perspectives on policy issues that cut across conventional program areas. Staff agency SSET generalists have access to both the governor and legislature which puts them in a unique position. They can serve a critical communications role as the interface between the scientific community and the elected officials.

It should be remembered that an end point has not been reached in the process of state SSET evolution. The Maryland experience has paralleled and in many cases, preceded that of several other states. Maryland is integrating S/T inputs into the government decision-making process in both the executive and legislative branches. What remains is to continue to strengthen that contribution through reinforcing the established SSET mechanisms and exploring the potential for creating additional or more effective institutional links between the science community, state government and the public.

Part II. MARYLAND'S EXPERIENCE WITH TECHNOLOGY ASSESSMENT

A. The States' Role in Technology Assessment

1. Definition

Technology assessments are studies directed at exploring the impacts on society of the introduction of new technology, or the expansion or extension of an existing technology in new or different ways, or to a new and greater extent than in the past. In other words, technology assessment attempts to perform a comprehensive analysis of impacts of a technology on society including not only the traditional economic and safety criteria, but also embracing effects on the natural and social environment, institutions, political systems, legal implications, ramifications for trade, and virtually every other aspect of society.[1]

2. Background

The concept of technology assessment (TA) grew out of the activities of the Subcommittee on Science, Research and Development of the U.S. House of Representatives Committee on Science and Aeronautics beginning in 1965. The Subcommittee was responsible for exploring the feasibility, practicality, desirability and utility for an improved system of anticipating the effects of technological developments as an aid to legislative activities in particular, and to decision makers and policy formulation in general.[2] Government involvement in this area came about primarily as the result of the negative effects of certain technological

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1. Mock, John E., Candidates and Priorities for Technology Assessments - A Survey of State Officials, Vol. III, NSF, August, 1973, p. iii.

2. Ibid, p. 1.

developments of the day such as toxic pesticides, radioactive wastes, and electronic bugging devices. With the creation of the Congressional Office of Technology Assessment in 1972, the federal government's role with respect to technology was given official recognition. The OTA was given a unique role in assisting Congress through the "developing art of technology assessment, an interdisciplinary form of policy research designed to identify alternative approaches to technology-related issues and to provide thorough analyses of the probable consequences of such options."[3]

At about the same time as the creation of the federal OTA, there arose a growing concern for state involvement in technology assessment. In 1971, at a conference on TA sponsored by the National Academy of Public Administration, a panel concluded that "technology assessment is a legitimate and necessary state function, pointing to the importance of state involvement in TA because that is where the authority to act and the need to act is located.[4] In recognition of the need to draw state and local representatives into the federal TA process, Congress created the Intergovernmental Science, Engineering and Technology Advisory Panel (ISETAP) under the National Science and Technology Organization and Priorities Act of 1976. The ISETAP which is within the Executive Office of the President under the Office of Science and Technology Policy is a twenty member panel of governors, mayors, city managers, state legislators and county and regional officials charged with three

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3. Office of Technology Assessment, "Annual Report to the Congress," March 15, 1975, U.S. Government Printing Office.

4. Turley, Richard E. and Rogers, Wyatt M., Jr., The Western Regional Workshop on Technology Assessment - Summary of Proceedings, June, 1975, p. 1.

major responsibilities: 1) to identify and define civilian problems at state, regional, and local levels which science, engineering and technology may assist in resolving or ameliorating; 2) to recommend priorities for addressing such problems; and 3) to identify policies to facilitate the transfer and utilization of research and development results so as to maximize their application to civilian needs.[5] (Currently, Prince George's County Councilmember, Francis Francois, is a representative from Maryland on the panel.)

To date, at least three states have institutionalized the process of technology assessment in their executive branches. The Georgia Center for Technology Forecasting and Technology Assessment was established in 1970 "to carry out studies to assist the Governor and the members of the General Assembly: (1) in preparing for future technological developments, and (2) in avoiding undesired effects on our environment." The Hawaii State Center for Science Policy and Technology Assessment was established in 1971 to develop guidelines for a Hawaii State science policy, and to forecast and assess technical developments and their effects on Hawaii. In California, the Office of Appropriate Technology assesses the applicability of alternative forms of technology for solving problems in the public sector.

3. The Need for a State Role in Technology Assessment

Public sector involvement in technology assessment has come about for several reasons. At the federal level, there are

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5. Press, Frank, "Science and Technology in the Service of Cities," Public Management, July, 1978, p. 17.

macroeconomic motivations for actively promoting technological change. For example, certain innovations may be used to increase productivity and retard inflation or to improve the international competitiveness of U.S. products thereby improving the nation's balance of payments. Concern for public health, safety and welfare has justified the monitoring and, where needed, control of the adverse effects of technology by both federal and state governments

While the initiation of technological change in this country has been a role traditionally filled by private enterprise, there are compelling arguments for government intervention to influence the use of technology in certain circumstances. For one thing, it is generally believed that private firms will tend to underinvest in projects that would be profitable to society because they cannot capture all the benefits that arise from innovation. Secondly, the private sector cannot be expected to ensure the welfare of society because it responds to market signals which do not necessarily reflect social priorities. Finally, the limited scale of most firms prevents their undertaking large-scale or risky developments.[7]

The broad powers delegated to the States make them important agents in the TA process even though most states do not have separate offices that perform this function. There are several ways in which state governments can and do, directly or indirectly, influence technological development within the context of normal,

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6. Holloman, J. Herbert, "Government and the Innovation Process," Technology Review, May, 1979, p. 30.

7. Ibid, p. 30.

state operations. Among these are regulation, product testing, procurement practices, local grant-in-aid programs, sponsorship of demonstration projects, and policy formulation. Because of the potential impact of various state programs and policies on technological development, there is a need for a central focus for state TA activities. The advantage of locating the primary responsibility for TA in a single office is that problems overlapping several departments and therefore, unlikely to be comprehensively addressed by any of them, or problems not clearly falling within the purview of any existing department, or problems barely discernible on the scientific horizon - can best be identified and dealt with by an independent agency.[8] Furthermore, if the responsibility for state TA activities is channeled through an agency which functions as the central policy management arm of the executive branch, a much stronger link can be forged between TA and policy formulation than if an entirely separate agency were to manage TA activities alone.

4. Technology Assessment in Maryland

a. Institutional Setting

Although Maryland currently does not have a central office which has been designated responsible for coordinating or performing technology assessments, the various components of the Executive Branch involved in science and technology related issues form a network within which the evaluation of technological developments occurs. Science in the Maryland Marketplace, 1978-1979, a directory of science resources in the State, lists thirteen agencies in the Executive Branch and an equivalent number of offices within the State university system that conduct

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. Mock, John E., p. 3.

scientific and technological research. TA in Maryland is not, however, organized as a process in which selected new technologies are evaluated because of their anticipated significant impacts. While this applies to a limited number of cases, the majority of studies undertaken by the State which are classifiable as TA's are initiated by the identification of a specific problem. For example, how can the State insure the health and safety of people in connection with the mining of bituminous coal, or how can the State provide an adequate education for all of its citizens are legitimate questions for which the State seeks the most appropriate solutions. This approach to TA reflects the problem-solving and policy orientation rather than technology orientation of the public sector which must address the immediate and future needs of its constituency.

b. Maryland's Power Plant Siting Program - An Institutional Response to a Technological Problem

In the area of energy production, Maryland has taken an innovative institutional approach which provides an excellent example of the organization of TA activities in the State for the purpose of addressing a critical public issue.

The Power Plant Siting Program (PPSP) grew out of a controversy over the location of Maryland's first nuclear power plant. The State's Public Service Commission (PSC), charged with the responsibility of plant certification, determined that insufficient technical information existed with respect to the potential impacts associated with the plant's proposed location and the larger issue of the State's future power demand. Through a joint agreement involving the utility

companies, public interest groups and State government, the PPSP was created for the purpose of conducting environmental research and site evaluation and "to insure long-range and timely planning for power plant site selection and acquisition."[9] A unique feature of the program is the provision for State acquisition of land to be used for the future location of power plants. Financing for the program is provided through an environmental trust fund which is raised through a surcharge on currently generated kilowatt hours of electricity. The PPSP offers the institutional advantage of the separation of S/T research activities from regulatory power which still rests with the PSC. Responsibility for the administration of the PPSP lies with the Department of Natural Resources. However, the participation of the Departments of Health and Mental Hygiene, Economic and Community Development, and State Planning are mandated by the PPS legislation.

Under the PPSP, continuing research on electric power plant site evaluation and related environmental and land use considerations is conducted. Activities include general biological and ecological baseline investigations with particular emphasis on the biology, chemistry, and physics of the Chesapeake Bay and its tributaries; research to assist prediction of the variation in natural waters resulting from the operation of electric generating plants such as changes in temperature, oxygen levels, salinity, radionuclides and heavy metals; provisions for monitoring the operations of existing and future electric power

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9. Article 66C, Chapter 31, Sec. 763 through 768, the Annotated Code of Maryland.

facilities; evaluation of the environmental, public health, and socio-economic impacts of electric power facilities.

The PPS Environmental Research Program forms the basis of an Environmental Statement which the Department of Natural Resources must issue concerning the long-range (at least 10 year) power plant site plan which is prepared by the PSC in cooperation with the utility companies. The Environmental Statement includes an evaluation of environmental impact at each proposed site, possible alternatives to the site, any irretrievable commitments of resources that would be involved, any objections raised by federal or other state agencies, and a plan for monitoring the environmental effects of the proposed action including provisions for remedial steps which must be taken in the event of additional, unanticipated adverse impacts.

On a biennial basis, a final Cumulative Environmental Impact Report on all operating electric power plants in the State is published by the Department of Natural Resources. The report contains recommendations to the Governor on State environmental policy and objectives and includes a section prepared by the Department of State Planning devoted to the growth-related factors which justify the specific additional increase in electrical generating capacity contained in the long-range plan.

Once the long-range plan and environmental report are completed, the Department of Natural Resources is charged with the responsibility for acquiring a sufficient number of sites to satisfy the expected electric power requirements of the State.

The current program goal is the acquisition of four power plant sites, one for each of the major electric utilities in the State. To date, one site of approximately 1,000 acres has been purchased in St. Mary's County for a Potomac Edison Power Company plant. Purchase of a second site currently owned by the federal government is under negotiation and would be used for the construction of a plant by the Baltimore Gas and Electric Company.

B. Expanding the Technology Assessment Capability of State Government Through Technology Transfer

1. Definition

Technology transfer encompasses the collection, documentation, and dissemination of scientific and technical information, including data on the performance and costs of using the technology; the transformation of research and technology into processes, products, and services that can be applied to public and private needs; and the secondary application of research or technology developed for a particular mission that fills a need in another environment.[10]

2. Background

The concept of technology transfer grew out of the realization at the federal level that the results of heavy investment in technology aimed at solving national defense problems could be beneficial in a civilian context. Following the rapid growth of R&D efforts during World War II and the development of peacetime "space race" technology, public priorities began to change. Social

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). Directory of Federal Technology Transfer, June 1977, Executive Office of the President, Federal Coordinating Council for Science, Engineering and Technology, p. v.

problems such as poverty, crime, the need for improved transportation systems, environmental pollution, and energy led to a reorientation of the nation's R&D efforts. The proliferation of federal assistance programs aimed at solving domestic problems created the need for facilitating exchange of ideas and technical information from one level of government to the next as well as between the public and private sectors giving the term "technology transfer" a new interpretation. In addition, it has often been demonstrated that technological solutions can be transformed in order to solve problems in different areas of domestic need as for example, the use of lasers for communication transmission and for performing microsurgery.

Thus, technology transfer encompasses not only the direct application of a particular technology to solve a specific problem but also the evaluation of the alternative uses of that technology, and the communication of its immediate and potential uses within and between the public and private sectors.

The federal government is by far the most active agent in the field of technology transfer. The Directory of Federal Technology Transfer contains a multitude of technology transfer programs available through forty-nine federal agencies. There are opportunities for state involvement in these programs in the areas of health, education, environment and natural resources, housing, community development, agriculture, business and commerce, disaster planning, employment, energy, legal services, transportation, science and technology, social services, construction, and consumer protection.

3. Maryland's Case Study - The Application of Remotely Sensed Data to Current State Problems

a. Background

Maryland has maintained a continuing interest in the application of remotely sensed data, particularly that collected from the Landsat and associated high altitude aircraft platforms, to contemporary policy issues in State government. Likewise, Maryland has been at the vanguard in the development of automated geographic information systems. These two factors, combined with the Department's responsibility to function in a policy advisory capacity as the Governor's staff agency in planning matters and to provide information to the General Assembly, create an excellent environment for furthering the use of these contemporary technologies in the formulation of state policies and strategies for specific issues.

In 1972, the Department of State Planning established the Maryland Automated Geographic Information (MAGI) System. The MAGI system stores physical and cultural data by grid cells which are disaggregations of the Maryland Coordinated Grid System. Each cell measures 2000 feet on a side, and encloses an area 91.8 acres in size. Using MAGI, simple data listings and sophisticated interpretive analysis can be prepared and displayed in map and tabular form. The capabilities of the system have been expanded to support small-area (4.5 acre) data items for special projects.

To date, the MAGI data base has been expanded to include twenty-three data variables. These variables include such information as soils, geology, land use, historic sites, and

the availability of public sewer and water services. Use of the system by both Departmental and non-departmental users continues to grow. Users have included several state agencies among these Transportation, Agriculture, and Natural Resources; The Baltimore Regional Planning Council; the Johns Hopkins University; and several Maryland counties.

In 1973, the Department initiated a demonstration project with the National Aeronautics and Space Administration to test the application of data gathered by the first Earth Resources Technology Satellite (ERTS-1) to state planning in Maryland. A key objective of this effort was to examine, test and apply remotely sensed data from satellites and other sensors in the context of a statewide land use program. Secondary to this objective was the desire to make remotely sensed data available to the executive agencies of Maryland State government as well as to regional and local planning agencies. This effort continued for twenty-four months and permitted the Department to test the "state of the art" applications in an environment of executive agency information needs. As part of the demonstration project, the Department convened workshops for various state agency staff with private industry experts to discuss potential applications of the emerging technology within their respective functional areas. The interest was high, but even the most promising applications had not established a reliable record and all aspects of the technology were rapidly changing. Executive agencies, responsible for program implementation and policy formulation, were reluctant to commit themselves to a science that was largely experimental.

The study concluded that there were numerous opportunities for utilizing space age technology for State planning. However, several obstacles prevented immediate use. These included: a shortage of individuals capable of working with the information, the experimental rather than operation nature of most of the applications, and several technical limitations, particularly the resolution of the satellite data which affected its utility in a small and diversified state such as Maryland.

Several years have passed since the development of the Maryland Automated Geographic Information System and the earliest efforts to involve the Department of State Planning as well as other executive agencies with the Landsat (formerly ERTS) program. During that period, significant technological improvements have been made in both the hardware and software aspects of satellite data collection and analysis. In addition, the number of individuals, public institutions and private organizations that have tested remotely sensed imagery has substantially demonstrated the utility of the technology.

The launching of Landsat 3 in March, 1978 has provided the Department of State Planning with the opportunity to test the applicability of satellite data which is of a higher resolution and expanded spectral sensitivity than previously available. Recent improvements to the MAGI system have placed the Department in a uniquely advantageous position for interfacing these two technologies - Landsat and MAGI - in order to supply a broad range of technical information needs leading to the formulation and implementation of various state policies.

b. Project Objectives

The Department of State Planning has undertaken the task of interfacing Landsat data with ancillary data in the MAGI system. As previously stated, the MAGI system is an information system which has as its primary source of input a base composed of data referenced by geographic coordinates and in which a major part of the processing is done with a digital computer. This effort is being pursued with the assistance of the Eastern Regional Remote Sensing Applications Center of the National Aeronautics and Space Administration located at the Goddard Space Flight Center in Greenbelt, Maryland. Staff time has been primarily covered by the Department's SSET grant. The project demonstrates the effective transfer of a highly advanced technology from the federal to the state level and the potential use of that technology by the Maryland Executive Branch for the formulation of State development policy. As pointed out by the International Geographical Union Commission on Data Sensing and Processing, the concept of an information system is broader than the concept of processing techniques: "An information system is a chain of steps that leads from observation and collection of data through analysis to use in some decision-making process."

The major objectives of the Landsat/MAGI interface project are:

1) To assess the utility of remotely sensed data and automated data handling techniques for providing and maintaining an information base that assists in the formulation and implementation of State policy.

2) To identify and test one or more institutional arrangements that would provide for the efficient operation of a continuing program of technology assessment in the areas of remote sensing and automated geographic information systems.

3) To assess the applicability and transferability of remotely sensed data and automated data handling techniques to selected issues of immediate concern to the Executive Branch of State government.

Based upon the outcome of the Landsat/MAGI interface project, this report recommends further development of the State's capability for using these combined technologies as an effective tool in aiding decision-making.

c. Results and Conclusions

The following discussion is based on the findings of a workshop on remote sensing sponsored by the State and the outcome of two demonstration projects undertaken by the Department of State Planning in cooperation with NASA. Additional projects are currently being performed by the State Water Resources Administration and the State Forest Service, both branches of the Department of Natural Resources with State Planning serving as the technical coordinating agency.

A workshop on the utilization of satellite data was sponsored by the Maryland Department of State Planning during June, 1978. The workshop, aided by the National Conference of State Legislatures, and NASA was organized to acquaint

various state agencies in Maryland with applications of satellite data in other states. Twenty-five representatives of legislative committees and ten Maryland agencies attended. The program included a general introduction to the terminology, technology, and NASA's earth science programs. An overview of current Landsat applications was presented by Paul Tessar of NCSL. The program included Mr. Ken Hansen of the Oregon Land Conservation and Development Commission, Mr. Jerry Schlesinger of the South Dakota Land Resources Information System, Ms. Peggy Harwood of the Texas General Land Office, and Darrell Williams of NASA-Goddard.

Based on the workshop, the Department identified several potential applications for remotely sensed data in problem areas of concern to state program managers and decision-makers. These included: 1) monitoring the expansion and reclamation of strip mining, 2) aiding the development of areawide wastewater treatment plans through the identification of vegetative cover and detection of sedimentation, 3) monitoring land use changes as part of state, areawide and county land use planning and growth management efforts, 4) providing information for state agriculture and forest management programs, 5) detecting modifications to areas of state critical concern, and 6) conducting suitability analyses for siting major facilities. It was concluded that advances made in both collection and processing technologies as well as the experience Maryland and other states have gained in working with Landsat technology have greatly increased the ability of state program managers and decision-makers to identify applications for satellite data.

Following the workshop, the Department of State Planning met with representatives from other Maryland agencies on an individual basis to identify specific projects that could be used to test the utility of Landsat data within the context of state program needs. Four demonstration projects were defined: 1) wastewater impoundment identification, 2) land use classification, 3) forest cover classification, and 4) land use change detection. The first two of these efforts were undertaken by State Planning in cooperation with the Water Resources Administration as part of the SSET program. The classification of forest cover and the land use change detection study are on-going efforts that State Planning is pursuing with the Maryland Forest Service and the Water Resources Administration.

The Maryland Water Resources Administration has the responsibility of licensing and surveying all wastewater impoundment areas throughout the State. By manually researching the licensing permit files located at the Department of Natural Resources and comparing the data with recent mapped data, the Water Resources Administration discovered that a large percentage of the mapped ponds were not licensed. As an alternative to spending countless hours and monies manually field checking every agricultural and industrial impoundment, the Department of State Planning, NASA, and the Water Resources Administration decided to include this as one of the demonstration projects in the work program between the first two previously mentioned agencies. 1978 Landsat imagery of the study

areas was used to locate these impoundments for selected target areas. This method was to be given serious consideration by the Water Resources Administration as a viable research and monitoring tool if resulting accuracy and turn-around time for final products proved to be within reasonable limits.

In general, valuable knowledge was gained from the efforts of using Landsat imagery to locate surface impoundments in both the urban and rural study areas selected. The image of Curtis Bay, an urban area surrounded by water, more clearly identified pond locations than the image of the inland, rural area of the Funkstown Quadrangle. A variety of tests were performed with the computer to enhance imagery distinction between land and water. In the Curtis Bay site, some confusion was caused by the imagery similarity of paved urban areas and water surfaces. The presence of extensive wet areas in addition to self-contained impoundments also created interpretive difficulties. Within the rural study area, Landsat imagery could be used to locate existing ponds but proved ineffective for locating additional impoundments. Although there was good potential for using remotely sensed data for locating surface water impoundments, the degree of resolution currently available was demonstrated to be insufficient for that purpose.

The second project that was undertaken within the SSET program was the ORSER Land Use Project. The purpose of this project was to develop an accurate land use classification for a 95,000 acre study area divided between two urban counties. The digital analysis was performed on the ORSER (Office of

Remote Sensing of Earth Resources) system operational at Penn State University. The major products of the study were a level 2 land use classification map and an output tape in MAGI format that could be checked for accuracy against existing data sources. Attempts were also made to identify those areas consistently misinterpreted or areas where confusion existed between two land use classes and to determine the cause.

The results of the ORSER Land Use Project were very encouraging. A relatively high degree of correlation was demonstrated between the land use classifications assigned using the Landsat imagery and those provided by existing surveys based on high-altitude photography. Within the extremely diverse urban areas, some resolution problems occurred. However, based on the results of this demonstration project, the Department of State Planning plans to continue to develop the application of Landsat data in its statewide land use efforts.

The integration of satellite data with the Maryland Automated Geographic Information system and the prospect of using the more detailed imagery and finer resolution that will be available with Landsat D to be launched in 1981 will greatly improve the Department's data management capabilities. The advantages of a satellite linked data gathering system include impressive cost savings and, with the greater resolution potential, a higher degree of accuracy than with the current process which relies on photointerpretation of individual aerial photographs and cumbersome manual mapping, encoding,

and updating techniques. By devoting far less time and effort to data collection and preparation, greater emphasis can be placed on the problem-solving capability of this technical information resource in the formulation of State development policy.

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APPENDIX

ARTICLE 88C

1.

There shall be a Department of State Planning responsible to the Governor, headed by the Secretary of State Planning, as provided for in Section 226 of Article 41 of this Code. It shall be the purpose of the Department to function as the Governor's staff agency in planning matters, and to prepare, recommend and keep up to date a balanced, integrated program for the development and effective employment of the natural and other resources of the State, in order to promote the health, safety and general welfare of its citizens. In the execution of its purposes, the Department shall function as an advisory, consultative and coordinating agency, (1) harmonizing its planning activities with the planning activities of departments, agencies or instrumentalities of State or local government; (2) rendering necessary planning assistance; (3) stimulating public interest and participation in the development of the State; (4) coordinating the plans and programs of all State departments, agencies and instrumentalities; and (5) coordinating the State programs with the federal government. Nothing contained in this article shall operate in derogation of planning powers conferred upon departments, agencies or instrumentalities of State or local government by any existing State or local law.

Purposes of Department; Advisory; Consultative; Coordinating Functions; Limitations

2.

(a) The Department of State Planning shall:

(b) Prepare, and from time to time amend, revise, or change, a plan or plans for the development of the State, which plan or plans collectively shall be known as the State development plan. The plan shall be based on studies of physical, social, economic and governmental conditions and trends and shall aim at the coordinated development of the State in order to promote the general welfare and prosperity of its people. In preparing the State development plan or any part thereof, and in preparing, from time to time, revisions, amendments, extensions or additions, the Department shall seek the comments of and consult with the local governments of the areas which are affected by the plan and shall seek the cooperation and advice of other appropriate departments, agencies and instrumentalities of federal, State and local government, regional and metropolitan planning commissions, educational institutions and research organizations, whether public or private, and of civic groups and private persons and interested organizations. The State development plan shall embody the policy recommendations of the Department of State Planning in regard to the economic and physical development of the State and shall contain:

Basic Duties; State Development Plan

(1) A statement of the objectives, standards and principles sought to be expressed in the plan;

(2) Recommendations for the most desirable general pattern of land use within the State, in the light of the best available information concerning topography, climate, soil and underground conditions, water sources and bodies of water, and other natural or environmental factors, as well as in the light of the best available information concerning the present and prospective economic bases of the State, water and sewerage facilities, trends of industrial, population or other developments, the habits and standards of life of the people of the State, and the relation of land use within the State to land use within adjoining areas;

(3) The identification of areas of critical State concern, after consultation with and consideration of recommendations submitted to the Secretary by the local subdivisions. The Department may establish guidelines for use by the local subdivisions in making their recommendations as to what are the areas of

critical State concern. Every county and the City of Baltimore shall make recommendations to the Department as to the areas within the respective jurisdictions which should be designated as being of critical State concern.

(4) The major circulation pattern recommended for the State, including major routes and terminals of transit, transportation and communication facilities whether used for movement within the State or for movement from and to adjoining areas;

(5) Recommendations concerning the need for the proposed general location of major public and private works and facilities, such as utilities, flood control works, water reservoirs and pollution control facilities and military or defense installations, which works or facilities, by reason of their function, size, extent, legal status, or for any other cause are of State as distinguished from purely local concern, or the authorization, location or construction of which are legally within the province or jurisdiction of State bodies or officials, or which for any other cause are appropriate subjects for inclusion in the State development plan as distinguished from the local or regional public plans or programs;

(6) A comprehensive analysis and evaluation of the capital plans and programs of the State departments, agencies, commissions, and instrumentalities;

(7) A review and analysis of all federal grants, loans or services of any type whatsoever available to this State, and State grants to local governments, including an analysis of the impact on this State of existing and proposed future federal programs;

(8) Such other recommendations of the Secretary concerning current and impending problems as may affect the State as a whole;

Studies and Investigations

(c) Make studies and investigations, insofar as may be relevant to State planning, of the resources of the State and of existing and emerging problems of agriculture, industry, commerce, transportation, population, housing, public service, local government and of allied matters affecting the development of the State, and in making such studies, seek the cooperation and collaboration of the appropriate departments, agencies and instrumentalities of federal, State and local government, educational institutions and research organizations, whether public or private, and of civic groups and private persons and organizations;

Governor's Principal Staff Agency in Planning

(d) Act as the Governor's principal staff agency in planning matters concerning the resources and development of the State and, in this capacity, undertake special studies and investigations, submit reports and render advice to the Governor whenever he may request;

Cooperation with General Assembly

(e) Provide information to and cooperate with the General Assembly or any of its committees in connection with the studies relevant to State planning;

State Capital Program; Annual Capital Budget

(f) Prepare the State's capital program and the annual capital budget, as well as study all capital projects proposed to be undertaken by State departments and agencies.

Resources, Facilities Inventories

(g) Prepare and from time to time revise inventory listings of the State's natural resources, and of major public and private works and facilities of all kinds which are deemed of importance to the development of the State as a whole;

Planning Assistance: State, local, Federal, regional agencies

(h) Cooperate with, and provide planning assistance, including but not limited to surveys, land use studies, urban renewal plans, technical services and other planning work, to county, municipal or other local governments, instrumentalities or planning agencies; and cooperate with and assist departments and other agencies or instrumentalities of federal, State and local government as well as regional, metropolitan, county, municipal or other local or private planning agencies in the execution of their planning functions, with a view to harmonizing their planning activities with the State development plan. The Department shall also cooperate and confer with, and upon request, supply information to federal agencies, and to local or regional agencies created pursuant to a federal program or which receive federal support, and shall cooperate and confer, as far as possible, with planning agencies of other states or of regional groupings of states. Whenever cooperation or assistance under this subsection includes the rendering of technical services, such services may be rendered free or in accordance with an agreement for reimbursement;

Public Information; Participation

(i) Provide information to officials of departments, agencies and instrumentalities of State and local government and to the public at large, in order to foster public awareness and understanding of the objectives of the plan and of the function of State, regional and local planning, and in order to stimulate public interest and participation in the orderly integrated development of the State.

(j) Accept and receive, in furtherance of its function, funds, grants and services from the federal government or its agencies, from departments, agencies and instrumentalities of State or local government, or from private and civil sources;

Receiving Federal Funds and Services

(k) Cooperate, in the exercise of its planning functions, with federal and State agencies in planning for civil defense;

Civil Defense Planning

(l) Correlate information and data concerning land and other real property owned by the State and its agencies and political subdivisions. This function involves a listing of the real property, together with pertinent details as to size, facilities and value, in order that the Department may serve as a repository and clearing house for information on available real property for public uses.

State Property Information Correlation

(m) Advise the Governor on the means and methods available to coordinate plans and programs of all State departments, agencies, commissions and instrumentalities in order to establish relative priorities and to avoid duplication and conflicts;

State Agency Planning Coordination

(n) Advise the Governor as to the means and methods available to coordinate plans and programs of federal, State, local, regional, metropolitan, county and municipal governments in order to avoid duplication and conflict.

Intergovernmental Planning Coordination

(o) Establish statewide classification standards for geographically referencing all basic planning data collected by State departments and units, which standards may be used by all units of State and local government.

Data Reference Standards

(p) Create a central depository for all government general, area, and functional plans as related to this article in effect and amendments thereto and revisions thereof prepared by State, regional, local, municipal and interstate agencies. Effective July 1, 1974, every State, regional, local, municipal and interstate agency shall submit to the Department such plans as they are promulgated. The Department shall by rule or regulation identify the plans required to be submitted.

State Depository of Plans

(q) Have the right and authority to intervene in and become a party to any administrative, judicial, or other proceeding in this State concerning land use, development or construction. Upon intervention, the Department shall have standing and all rights of a party in interest or aggrieved party, including all rights to apply for judicial review and appeal. In addition, it may file a formal statement of environmental or economic impact expressing the views of the Department and any other unit of the State government. The right of intervention in any administrative, judicial or other proceeding in this State may be exercised only in accordance with applicable rules of procedure and law as they relate to the proceeding. The Department and the governing bodies of the local subdivisions shall establish procedures for notification of the Department of applications for zoning, permits, or authority to use, develop, or construct upon land which involve more than a local impact and is of substantial State or regional interest.

Intervention in Administrative and Judicial, or Other Proceeding

(r) Exercise all other powers necessary and proper for the discharge of its duties.

Necessary Powers

3.

The Secretary may make agreements with heads of other State departments, agencies or local governments, or regional, metropolitan, county, municipal or other local planning agencies, or Federal agencies, for the temporary transfer of employees to such departments, agencies, local governments or such planning agencies to the Department of State Planning or for the temporary transfer of employees of the Department of State Planning to such departments, agencies, local governments or such planning agencies, and for the temporary exchange of employees between the Department of State Planning and such other agencies, for periods not exceeding ninety days for any one transfer. Such agreements shall not require the approval of the State Commissioner of Personnel, and employees so transferred shall, for purposes of the provisions of the classified service law, be deemed to have continued to serve in the position from which they were temporarily transferred or exchanged. In connection with such temporary transfers or exchanges of employees, the Secretary may agree to reimburse, or to receive reimbursement from the departments, agencies or local governments concerned. The Secretary may, also, from time to time, contract for professional or consultant services in connection with the work of the Planning Department.

Employee Transference; Professional and Consultant Services

1.

(a) There shall be a State Planning Commission within the Department of State Planning, which shall constitute an advisory board for the Department of State Planning. The State Planning Commission shall consist of nine members, seven of whom shall be appointed by the Governor, of whom none shall be persons holding a salaried State office, selected, as far as possible, to reflect different broad geographic, economic and social interests in the State. They shall serve for four-year terms, beginning as of

Creation; Membership; Qualifications; Term; Vacancies; Expenses of Members; Meetings

June 1 in the year in which appointed, and until their successors are appointed, except that of the members originally appointed four shall be appointed for a two-year term and the remainder for a four-year term. Members appointed by the Secretary of State Planning and in office on July 1, 1971, shall continue in office until the expiration of their terms. The Governor shall fill by appointment any vacancy for the unexpired balance of a member's term. Two members of the Commission shall be ex officio members, one of whom shall be a member of the House of Delegates of Maryland to be designated by the Speaker thereof, and the other of whom shall be a member of the Senate of Maryland to be designated by the President thereof. All members shall serve without compensation but shall be reimbursed for expenses incurred in the performance of their duties, in accordance with the standard travel regulations. The Governor shall appoint a chairman of the Commission. The State Planning Commission shall meet as often as necessary but at least twice each year, either on the call of the Secretary or on the call of the chairman. The chairman shall call a meeting of the Commission whenever requested to do so by the Secretary of State Planning or by any three members of the Commission. The Secretary of State Planning shall designate another member of the staff of the Department of State Planning, who shall serve as Secretary to the Commission in addition to his regular duties of employment with the Department of State Planning.

Commission Subcommittees

(b) The State Planning Commission may from time to time, with the approval of the Secretary of State Planning, establish subcommittees and may delegate such of its functions to subcommittees as it may deem appropriate. The chairman of the Planning Commission may appoint to membership of the subcommittees non-members of the Commission specially qualified in matters to be considered by such subcommittees. Unless authorized by a majority vote of the State Planning Commission, and approved by the Secretary of State Planning, the number of such special subcommittee members serving on any one subcommittee shall be less than the number of members of the State Planning Commission serving on such subcommittee. All members of subcommittees shall be reimbursed for necessary expenses incurred in the performance of their duties.

Commission Duties; Reports to Secretary

(c) The State Planning Commission shall advise and report to the Secretary of State Planning on all matters submitted to it by the Secretary, such as, but not limited to, the State Development Plan, current operations and activities of the Department of State Planning, the needs of the State for further development, the establishment of regional or metropolitan planning areas, the effectiveness of the Department and its planning activities, and public awareness and understanding of the objectives and functions of State and local planning. The State Planning Commission may, with the approval of the Secretary of State Planning, hold public or private hearings and sponsor public forums in any part of the State whenever it deems it necessary or useful in connection with its advisory functions.

5.

State Development Plan; Submission to Governor

Upon the preparation of the State development plan or of any substantial phase or part thereof, or upon the preparation of an amendment or revision of or addition to the State development plan, the Secretary of State Planning shall submit the same to the Governor, who may file it, together with his comments, in the office of the Secretary of State. Upon filing it, the Governor shall transmit copies thereof, together with copies of his comments, to the heads of all departments and agencies of State government and to the General Assembly. If the Governor files such plan or part of a plan, the Department of State Planning shall make copies of the material so filed available for general distribution or sale.

6.

Capital Improvement Programs

The Department of State Planning shall prepare, amend and keep up to date a five-year program of State public works and major capital improvement projects undertaken or recommended to be undertaken by the State. Such program may also contain major projects undertaken or recommended to be undertaken with State aid or under State regulation. In preparing the program, the Department of State Planning shall have the collaboration of the Department of Budget and Fiscal Planning. The program shall classify projects in regard to the urgency and need for their realization, and shall recommend a time sequence for their construction. The program shall also contain the contract price or estimated cost of each project and shall indicate probable operating and maintenance costs and probable revenues, if any, as well as existing sources of funds or the need for additional sources of funds for the construction and operation of each project. The capital program shall, as far as possible, be based on existing information in the possession of the Department of State Planning, the Department of Budget and Fiscal Planning and other departments and agencies of State government. Heads of departments and other agencies and instrumentalities of State government shall transmit to the Secretary of State Planning a statement of all capital projects proposed to be undertaken by their departments or agencies for study, advice and recommendation by the Department of State Planning and for consideration for inclusion in the capital program of the State. Such department or agency heads shall also, upon request, submit such information to the Department of State Planning and to the Department of Budget and Fiscal Planning as these agencies may require in the preparation of the program. The Department of State

Planning shall receive the assistance of the Department of Budget and Fiscal Planning in connection with the preparation of the annual capital budget.

7.

Revolving Preliminary Planning Fund

The Governor shall provide in his annual budget a sum sufficient to establish a Revolving Preliminary Planning Fund under the jurisdiction of the Board of Public Works. For any project which is a part of the capital improvement programs established pursuant to Section 6, funds may be made available, upon recommendation of the Department of State Planning with the approval of the Board of Public Works, for preliminary plans, studies, designs, and outline specifications from the Revolving Preliminary Planning Fund. Such sums advanced shall be reimbursed to the Revolving Preliminary Planning Fund with the approval of the Board of Public Works out of the annual general construction loan, or from any other special loan funds separately authorized by the General Assembly or from general funds.

8.

Financial Planning Assistance to other Planning Agencies and Commissions

The Department of State Planning may render financial or other planning assistance to county, municipal or other local governments, instrumentalities or planning agencies and to regional or metropolitan planning commissions. Such assistance may be conditioned on equal, larger or smaller contributions by the agency which requests such assistance, but in any case in which funds or services are requested and received by the Department of State Planning from any federal agency for planning assistance to county, municipal or other local governments, instrumentalities or planning agencies, or to regional or metropolitan planning commissions, the condition imposed by federal law or regulation shall be carried out. Whenever federal laws or regulations condition such grants upon equal, larger or smaller contributions without specifications as to whether the State, or the locality receiving planning assistance shall make such contribution, the Department of State Planning may supply such contribution or any part thereof. Whenever the Department of State Planning is requested to render financial assistance to a regional, metropolitan, county, municipal or other local planning agency, the Secretary of State Planning shall first consider the adequacy and competency of the particular agency. All local governments, instrumentalities or planning agencies receiving financial or other planning assistance from the State shall at the request of Secretary of State Planning submit copies of their planning budgets for planning purposes to him. He may also require an annual audit of their financial operations related to planning by the state auditor, or by auditors or accountants legally qualified to perform municipal audits. When a local government, instrumentality or planning agency receives financial or other planning assistance from federal agency, the Secretary of State Planning may accept such federal agency's audit.

9.

Annual Report

(a) The Department of State Planning shall submit an annual report to the Governor sixty days before the General Assembly convenes for a regular session. The annual report shall contain summaries of those sections of the State development plan which have been amended, revised, added or deleted during the year which have previously been filed by the Governor in accordance with §5, and the nature of all such amendments, revisions, additions and deletions shall be clearly indicated. The annual report shall also contain summaries of important studies partially or entirely completed by the Department of State Planning and summaries of the work of the Department and of the State Planning Commission.

Special Reports

(b) The Department of State Planning shall also submit special reports upon the request of the Governor or the General Assembly, or of the Legislative Policy Committee, or at the discretion of the Secretary, on those aspects of the Department's work which may be deemed of current interest. Special reports on major research and planning projects, as distinguished from mere compilations of current data, shall be made available as soon as practicable after completion.

Distribution

(c) The Department of State Planning shall distribute copies of its annual report to the members of the General Assembly, to the heads of all State departments and all local, regional and metropolitan planning agencies in the State, and upon request, to interested federal agencies. The special reports of the Department of State Planning shall be distributed in the same manner as the annual report unless the Governor directs otherwise. The Department of State Planning shall make copies of special and annual reports available for general distribution or sale.

10.

Deadline for Submission of Capital Projects Requests

(a) All requests by State agencies for capital projects shall be submitted to the Department of State Planning before July 1 of the fiscal year prior to the fiscal year in which they are to be commenced unless the requesting department declares the project to be an emergency.

Description of Purpose of Project

(b) No appropriations shall be authorized for preliminary planning funds unless the agency in question has submitted to the Department of State Planning a program describing in detail the purpose of the project for which funds are being requested.

Changes in Project

(c) No changes shall be permitted in any project for which funds are requested after the prelim ary plan has been completed and approved except upon the approval of the Secretary of the Departme of State Planning and the Secretary of General Services.

List of Projects to be Funded from Non-budgeted Funds

(d) Notwithstanding the provisions of Section 15 (e) of Article 77A of this Code, or any otl law, to the contrary, all requests by State agencies for capital projects shall be accompanied with a c tailed listing of all expenditures proposed for capital improvements which will be funded from nonbu geted revenues or from grants of any kind.

11.

Regional Planning Assistance

In order to provide regional planning in the area of the State subject to the jurisdiction of the Mary land-National Capital Park and Planning Commission, the Department of State Planning is authorized t include in its annual budget such amounts as the Secretary deems appropriate as the State's share of th cost of regional planning projects programmed by the Commission for the following fiscal year, provide that in no event shall the annual payment exceed one hundred thousand dollars ($100,000.00). Th Secretary of the Department of State Planning shall determine which of said regional planning project shall qualify for State assistance, and the Commission shall furnish the Secretary with such informatio as the Secretary may require to make said determinations. On or before August 1, 1972, and on or befor August 1 of each year thereafter, the Commission shall furnish to the Secretary its proposed budget fo the following fiscal year. Thereafter, the Commission shall promptly notify the Secretary of and obtai his approval for any changes in the proposed budget for regional projects funded under this section. Not withstanding any of the provisions of Chapter 780 of the laws of Maryland, (1959), as amended, th Secretary may require an annual audit of the Commission's operations relating to any projects financed in whole or in part by payments to the Commission from the Department of State Planning.

12.

Excess State Property

All State agencies shall notify the Department of State Planning of any real property which is exces to the needs of the State agency, or of any substantial change of any real property owned by the State The Department of State Planning shall examine the proper disposition of such property, ascertain the interest, if any, of State agencies and local governments in such property, and shall make appropriate recommendations to the using State agency and to the Board of Public Works.

13.

Federal Grants-In-Aid

The Department of State Planning in coordination with the Department of Budget and Fiscal Planning shall issue rules and regulations to provide that:

(a) All State agencies applying for Federal funds, aid, grants or loans or other financial assistance except research or instructional contracts and grants shall, at the same time, file a copy of the application with the Department of State Planning.

(b) When any award of Federal funds, aid, grants or loans or other financial assistance except research or instructional contracts and grants is made to a State agency or local government a summary notification of the amount of funds awarded shall be filed with the Department of State Planning within 30 days of receipt. If as a condition to receiving the award, matching funds are required, the notification will indicate the amounts and sources of funds needed for matching purposes and the length of time such matching funds shall be required.

(c) A summary notification of funds awarded as research or instructional contracts of grants shall be filed with the Department of State Planning on a semi-annual basis.

The State of Maryland

Executive Department

EXECUTIVE ORDER

WHEREAS, The Governor's Science Resources Advisory Board was established by Executive Letter by Governor J. Millard Tawes in the spring of 1963; and

WHEREAS, Said Board has worked in the area of encouragement, coordination and guidance of science industry development in the State of Maryland and for the better communication among science industries in Maryland; and

WHEREAS, Said Board has performed these functions in cooperation and conjunction with the Department of Economic Development; and

WHEREAS, Both the Department of Economic Development and the Governor's Science Resources Advisory Board have recommended to the Governor that the functions of the Board relating to science industry development be assumed by the new Department of Economic and Community Development; and

WHEREAS, A need exists to have a permanent council to provide the Governor with advice, recommendations, interpretation of scientific problems or data, studies, forecasts of future scientific information and their relation with the State of Maryland, or other information or comment he may request.

NOW, THEREFORE, I, MARVIN MANDEL, BY VIRTUE OF THE AUTHORITY VESTED IN ME AS GOVERNOR OF THE STATE OF MARYLAND, ON THIS DATE, HEREBY PROMULGATE THE FOLLOWING EXECUTIVE ORDER:

1. The Governor's Science Resources Advisory Board is hereby abolished.

2. There is established, effective as of the date of this order, the Governor's Science Advisory Council which shall be an agency of the Executive Branch of the Government of the State of Maryland, and shall report and be responsible directly to the Governor.

3. The said council shall consist of no more than 30 persons of eminence in their respective fields of science who shall be appointed by the Governor. The term of each member shall be three years or until a successor is appointed and takes office. Any member of the Board shall be eligible for re-appointment. Of the members first appointed, 10 members shall be appointed for one year, 10 members for two years and 10 members for three years. One member shall be designated as chairman by the Governor

and shall serve as such during his full term of office as member. Me bers of the Board shall serve without compensation, but shall be reim bursed for their actual expenses incurred in the performance of their duties.

4. The council shall meet at least every four months at the ca of the chairman, and at such other times as may be designated by the chairman of the council or by the Governor.

5. The council is authorized to employ, with the approval of t Governor, an executive director, who shall report directly to the cou cil, who shall serve at the pleasure of the council and who shall perfo such administrative or other duties as may be assigned to him by the council or by the Governor.

6. Administrative, clerical and supporting services or facilit to aid the council in the execution of its duties will be provided throug arrangements with the Governor's office.

7. The powers and duties of the council shall be as follows:

(a) Provide the Governor with objective scientific or technological advice as he deems necessary and appropriate.

(b) To identify broad future problems in all fields t which scientific approaches shaould be applied and to formulate recon mendations to alleviate said problems.

(c) To define problem areas to which committees could find solutions or recommendations for action.

(d) To define scientific areas where additional rese or the analysis of data is badly needed; to review available resources perform such analysis; and to recommend the approach to be used.

(e) To improve scientific education, including ident fication of well-defined problem areas for studies to be performed by graduate students, particularly those studies which will be of value to the State.

(f) To act as a liaison with scientists of other stat or agencies in coordinating approaches to common scientific problem

(g) To provide scientific and technological advice to the principal Executive Departments -- at the Governor's request or his approval.

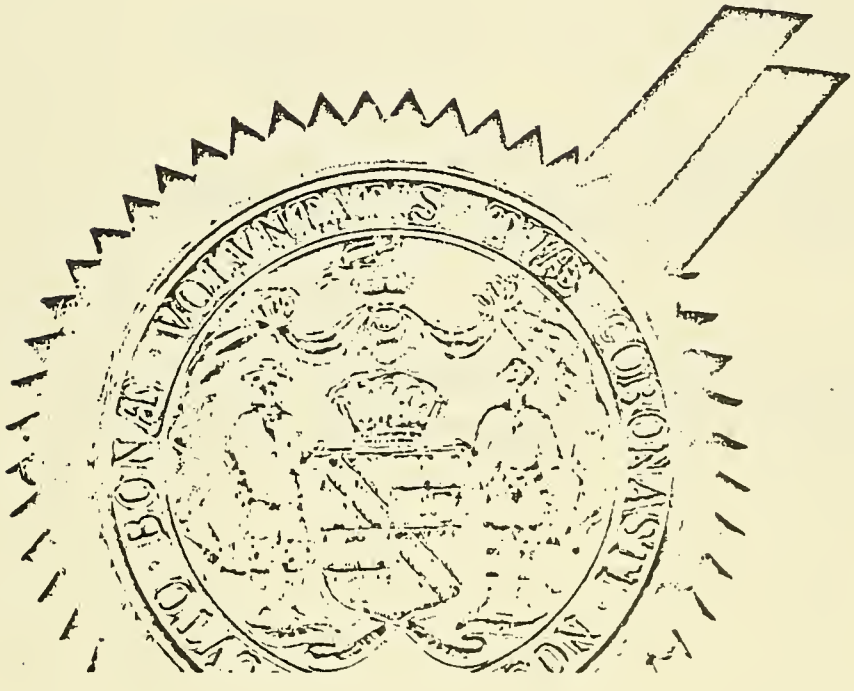
8. The council is authorized to promulgate, with the approval of the Governor, by-laws which shall not be inconsistent with this Executive Order.

GIVEN Under My Hand and the Great Seal of the State of Maryland, in the City of Annapolis, this day of , 1970.

Marvin Mandel
Governor of Maryland

ATTEST:

Blair Lee III
Secretary of State



GOVERNOR'S SCIENCE ADVISORY COUNCIL
Executive Department
State of Maryland
Annapolis, Maryland 21404

BYLAWS

I. Name, Purpose, and Membership

A. Name

The name of this organization shall be the Governor's Science Advisory Council, hereafter, referred to as the Council.

B. Purpose

To have a permanent Council to provide the Governor with advice, recommendations, interpretation of technological problems or data, studies, forecasts of future scientific information and their relation with the State of Maryland, or other information or comment he may request.

C. Membership

1. The Council shall consist of no more than thirty persons of proven preeminence in their respective professional fields. Technical areas currently under consideration by the Council will be considered in the appointment process.

2. Members shall be appointed directly by the Governor. A list of recommendations shall be submitted by the Chairman of the Council with the concurrence of a majority of the Executive Committee.

3. The terms of membership shall be three years or until a successor is appointed and takes office. Members may be reappointed by the Governor. One third of Council memberships shall expire each year.

II. Functions:

A. Direct technological support to the Governor. Provide the Governor with objective scientific or technological advice as he deems necessary and appropriate.

B. Identify broad future problem areas in all fiel to which scientific approaches should be applied and formulate recommendations to alleviate said problems and/ to capitalize on technological opportunities.

C. Define discrete, well-structured, scientific problem areas to which committees could find solutions or recommendations for action.

D. Define scientific areas where additional resear or the analysis of data is badly needed; review the available resources to perform such analysis; and recomme approaches to be used.

E. Improve scientific education, including identi- fication of well-defined problem areas for studies to be performed by graduate students; particularly those studie which will be of value to the State.

F. Act in a liaison capacity with scientists of ot states or agencies to coordinate approaches to common scientific problems.

G. Provide scientific and technological advice to Executive Departments--at the Governor's request or with his approval.

H. Maintain the highest professional standards in all of its functions and assignments.

III. A. Appointment

A Chairman shall be appointed by the Governor a serve at his pleasure during his full term of office as a member of the Council. The Chairman, with the consent of the Council, shall appoint a Vice Chairman to serve at the pleasure of the Chairman.

B. Duties

1. The Chairman (or Vice Chairman) shall presi over Council and Executive Committee meetings.

2. The Chairman and Vice Chairman shall have the customary duties and responsibilities of such officia

IV. Council Meetings

The Council shall meet four times per year. Additional meetings as may be warranted, or designated by the Governor, may be called by the Chairman.

V. Executive Committee

A. The Executive Committee shall consist of the Chairman, the Vice Chairman, and chairman of each standing or Ad Hoc committee.

B. Meetings

The Executive Committee shall meet no less than six times per year on a regular schedule.

C. Duties

1. Recommend to the Governor eminent Maryland scientists and engineers for appointment to the Council.

2. Establish Council and committee policies for approval by the Council.

3. Select and recommend to the Chairman issues or problem areas which the Council or its committees should undertake to study.

4. Review periodically the progress of standing and Ad Hoc committees.

VI. Standing and Ad Hoc Committees:

A. Establishment

Standing or Ad Hoc committees shall be established by the Chairman pursuant to Executive Committee recommendatio or request of the Governor.

B. Appointment of Chairman

The Council Chairman shall appoint the chairman of standing and Ad Hoc committees. Standing committee chairmen shall serve at the pleasure of the Council Chairman, and they may be reappointed. Ad Hoc committee chairmen shall serve until the dissolution of their committees.

C. Powers of Chairman

The Chairman of a Council committee shall selec the individuals to serve on his committee. He may also u non-Council member specialists on a consulting basis as required, or invite non-Council members to committee or Council meetings.

D. Reports and Recommendations

Formal reports, recommendations and other infor generated by a committee of the Council shall be approved the Council prior to being transmitted to the Governor.

VII. Communication:

A. To the Governor

The Council shall report directly to the Govern via the Chairman or a member designated by the Chairman.

B. To Others

With the Governor's prior approval, the Council may make its recommendations known to interested State agencies, the public, or other parties.

VIII. Finances:

A. Members of the Council shall hold an honorary position and their services shall not be compensated by salary. Members shall be reimbursed for out-of-pocket expenses and travel authorized in connection with Council activities.

B. Salaried staff, which shall include an Executiv Director and appropriate staff support, shall be provided by the State.

C. Appropriate funds for the Council shall be provided for through the budget of the State.

D. Funds received by the Council shall be audited and accounted for according to State of Maryland regulati Non-State funds shall be additionally audited and account for in accordance with rules prescribed by the grantor of such funds.

IX. Staff:

A. Executive Director

1. The Executive Director shall be named by the Governor and shall serve the Chairman of the Council.

2. The Executive Director shall have all the customary duties and responsibilities of such office, including, but not limited to, the following:

a. attend Council meetings but may not vote

b. attend committee meetings but may not vote

c. provide minutes of all Council meetings and minutes of committee meetings and see that such minutes are available to the Council

d. follow the Chairman's recommendations in regard to the spending of funds and account for all funds expended

e. serve as the communications center for the Council in regard to correspondence, general information, secretarial services, etc.

f. work cooperatively with the Executive Committee and attend its meetings

g. serve as coordinator for Council and committee activities, and work closely with the Chairman as the Chairman directs

h. perform such other Council duties as may be assigned to him by the Council or by the Governor

B. Other Staff:

As required, appropriate staff support may be provided for the Executive Director.

X. Procedures:

A. Quorum

1. Members representing a majority of total Council active membership shall constitute a quorum.

2. No formal action may be taken at a Council meeting unless a quorum is present.

3. A descriptive agenda shall be mailed to all Council members with notice of a meeting at least t days in advance of the meeting.

B. Balloting

1. Rules for voting procedures shall be determ by the Executive Committee. In the event of grieva members may appeal to the Council.

2. The Council shall vote on the following:

a. policy recommendations by the Executive Committee

b. committee recommendations and reports

c. any other items the proper authority fo which has not been delegated to a perso or unit of the Council

C. Retention of Membership

1. Any Council member who does not attend at least two meetings of the Council per year shall be considered to be an inactive member and subject to replacement.

2. Council members shall not send a representa to either Board meetings or committee meetings.

XI. Amendment

A. These articles may be amended at a Council meet so long as such amendments are consistent with the Execut Order establishing the Governor's Science Advisory Counci of June 15, 1970.

B. Individual Council members or the Executive Committee may present an amendment for consideration at the next meeting.

C. Amendments shall not be adopted unless more than two-thirds of Council members vote favorably in person or by proxy.

D. Amendments are subject to approval by the Governor.

GOVERNOR'S SCIENCE ADVISORY COUNCIL

September 1979

Mr. Tyler Bastian
Maryland Geological Survey
Merryman Hall
Johns Hopkins University
Baltimore, MD 21218
Office phone: (301) 235-0771
Home phone: (301) 243-6523

Dr. Frank L. Bentz, Jr.
Central Administration Bldg.
University of Maryland
Adelphi, MD 20783
Office phone: (301) 853-3621
Home phone: (301) 774-9051

Dr. Everett Carter
Civil Engineering Department
University of Maryland
College Park, MD 20742
Office phone: (301) 454-5166
Home Phone: (301) 762-0176

Dr. Rita Colwell
Skinner Hall, Rm. 1128
University of Maryland
College Park, MD 20742
Office phone: (301) 454-5376
Home phone: (301) 229-5129

Dr. Edward J. Cook, Asso. Dean
U.S. Naval Academy
Annapolis, MD 21402
Office phone: (301) 267-2197
Home phone: (301) 268-7341

Dr. Sally H. Dieke
Dept. of the History of Science
Rm. 234 Gilman Hall
Johns Hopkins University
Baltimore, MD 21218
Office phone:
Home phone: (301) 433-3165

Dr. Evans Hayward
Center for Radiation Research
National Bureau of Standards
Washington, D.C. 20234
Office phone: (301) 921-2503
Home phone: (301) 365-7856

Dr. John G. Honig
7701 Glenmore Spring Way
Bethesda, MD 20034
Office phone: (301) 695-0039
Home phone: (301) 469-7783

Mr. Mitchell A. Kapland
Trident Engineering Asso., Inc.
48 Maryland Avenue
Annapolis, MD 21401
Office phone: (301) 267-8128
Home phone: (301) 224-3244

Dr. Alexander Kossiakoff
Applied Physics Laboratory
Johns Hopkins University
Johns Hopkins Road
Laurel, MD 20810
Office phone: (301) 953-7100 X3033
Home phone: (301) 774-7368

Dr. Samuel P. Massie
Professor of Chemistry
U.S. Naval Academy
Annapolis, MD 21402
Office phone: (301) 267-3305
Home phone: (301) 674-2891

Dr. Joseph H. McLain
President, Washington College
Chestertown, MD 21620
Office phone: (301) 778-2800 X201
Home phone: (301) 778-2360

Dr. Harold D. Palmer, Associate
Dames & Moore Suite 700
7101 Wisconsin Avenue
Washington, D.C. 20014
Office phone: (301) 652-2215
Home phone: (301) 647-9161

Dr. Michael J. Pelczar, Jr., President
Council of Graduate Schools, U.S.
Suite 31
1 Dupont Circle N.W.
Washington, D.C. 20036
Office phone: (301) 223-3791

Dr. Gerard H. Schlimm
Division of Engineering &
Physical Sciences
Johns Hopkins University
Baltimore, MD 21218
Office phone: (301) 338-7190
Home phone: (301) 323-0658

Dr. Seymour D. Silver
2920 W. Strathmore Avenue
Baltimore, MD 21209
Home phone: (301) 764-1541

Dr. Jack E. Snell, Director
Office of Energy Conservation
National Energy Lab. Rm. 127A
Washington, D.C. 20234
Office phone: (301) 921-3275
Home phone: (301) 770-0912

Dr. Julius H. Taylor
Chairman, Department of Physics
Morgan State College
Baltimore, MD 21212
Office phone: (301) 444-3226
Home phone: (301) 367-3336

Mr. Calvert B. Tolley
Meredity & Meredith
Box 120
Wingate, MD 21675
Office phone: (301) 847-8300
Home phone: (301) 847-8161

Mr. William C. Vergara
Director, Physical Electronics
Bendix Communications Division
Bendix Corporation
Baltimore, MD 21204
Office phone: (301) 823-2200
Home phone: (301) 825-0387

Executive Director

Mr. Harry Kriemelmeyer
P.O. Box 460
College Park, MD 20740
Office phone: (301) 927-3062
Home phone: (301) 372-8766

The Governor

EXECUTIVE ORDER 01.01.1980.01

STATE DEVELOPMENT COUNCIL

WHEREAS, There is need for development of a more consistent State policy with respect to physical development decisions and local and State government policies and regulations which impact upon them in order to relate economic development, transportation and physical infrastructure and natural and historic environment, and to define development policies with respect to urban, suburban and rural areas within the State; and

WHEREAS, This need is evidenced by a number of recent developments, including recommendations of the Department of State Planning concerning location of new State facilities within existing developed areas, suggestions of the Maryland Department of Agriculture and the Maryland Environmental Trust relating to discouragement of development of agriculture land, increased emphasis by the Maryland Department of Transportation on management of existing roads and facilities, and recent proposals of Federal agencies, including the United States Departments of Agriculture, Commerce, Housing and Urban Development, Interior and Transportation, concerning preparation of State development policies; and

WHEREAS, Other developments, including increasing energy costs, the costs of construction and maintenance of new transportation facilities, and the limited availability of funds for sewer treatment facilities render desirable a comprehensive review of State laws, regulations and policies affecting physical development decisions and economic growth.

NOW, THEREFORE, I, HARRY HUGHES, GOVERNOR OF MARYLAND, PURSUANT TO ARTICLE II, §24 OF THE CONSTITUTION OF MARYLAND AND ARTICLE 41, §15C OF THE ANNOTATED CODE OF MARYLAND, PROMULGATE THE FOLLOWING EXECUTIVE ORDER:

1. There is hereby created a State Development Council;

2. The Council shall be composed as follows: the Secretaries of Planning, Economic and Community Development, Health and Mental Hygiene, Agriculture, Natural Resources and Transportation, or their designees, and the Lieutenant Governor. Principal staff support to the Council shall be provided by the Departments of State Planning and Economic and Community Development. The Secretary of State Planning shall be Chairman;

3. The Council shall make recommendations concerning, but not limited to, the following:

(a) The appropriate content of an Executive Order relating to policies to guide the effective and efficient allocation of State resources for physical and economic development decisions concerning (1) location of State facilities provided for in the capital budget (2) policies of the State Department of Transportation concerning construction and improvement of, and acquistion of access rights to, existing and proposed State highways and other transportation facilities (3) policies of the State Department of Health and Mental Hygiene concerning local sewage treatment facilities and environmental standards (4) exercise of the intervention and critical areas powers of the Department of State Planning (5) targeting of State business and housing loan programs, and marketing and business promotion activities (6) the State Outdoor Recreation Plan and plans for community facilities and (7) other forms of State and Federal aid targeted to areas of greatest need;

(b) Review of existing State laws and constitutional provisions granting local zoning, growth management and bond-issuing powers and regulating sewer grants and highway construction as they relate to (1) rezoning of agricultural land (2) location of necessary public social service facilities and new major commercial and industrial facilities in existing developed areas and areas identified as targets for economic development (3) location of cultural and commercial facilities in residential areas (4) the operational integrity and consistency of the zoning and land use and economic development planning process and (5) adequate building code standards; and

(c) Existing tax policies affecting development.

4. The Council shall recommend to the Governor by July 1, 1980, the appropriate structure of a Task Force, including local government and legislative representation, to review and hold hearings on the Council's proposals. The report of the Council concerning the matters set forth in paragraph 3(a), including a proposed Executive Order, shall be submitted to the Task Force by October 1, 1980 and the report of the Task Force on these matters by January 1, 1981. The final report of the Council concerning the matters set forth in paragraphs 3(b) and (c) shall be submitted to the Task Force by June 1, 1981 and the final report of the Task Force, including appropriate legislative proposals shall be submitted to me by November 1, 1981; and

(5) All departments and agencies of State government shall cooperate with the Council in carrying out its work.

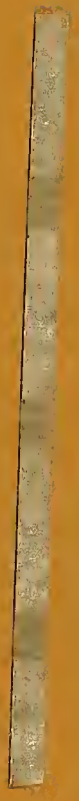
GIVEN Under My Hand and the Great Seal of the State of Maryland in the City of Annapolis, this 7th day of January, 1980.

HARRY HUGHES
Governor of Maryland

ATTEST:

FRED L. WINELAND
Secretary of State

[Md. R. Doc. No. 80-2-14]



UNIV. OF MD. COLLEGE PARK
3 1430 00301704 5

NOV 83
N. MANCHESTER,
INDIANA 46962